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Original Research Article

Serum magnesium level in eclampsia at tertiary care center, Gujarat, India

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ABSTRACT

Background: Magnesium may be physiologically important in blood pressure regulation whereas changes in magnesium levels could contribute to the patho-etiology of hypertension. The objective of the present study was to study the level and effect of magnesium in eclamptic pregnant women.

Methods: This cross-sectional study was conducted among 50 clinically diagnosed women with eclampsia in their third trimester of pregnancy. Inclusion criteria for the study was; females with singleton pregnancy, all in the third trimester which were diagnosed to have PIH based on the development of hypertension for the first time, proteinuria with or without edema, with no history of previous urinary tract troubles and no evidence of UTI. The concentration of total serum magnesium was measured by atomic absorption spectroscopy.

Results: Mean age, mean gestational age, mean total hospital stays, mean BMI, mean systolic BP and diastolic BP was 24.3 years with 5.1 SD, 36.4 week with 3.3 SD, 7.8 days with 2.4 SD, 28.9 wt/ht² with 4.8 SD, 146.5 mmHg with 14.7 SD and 95.9 mmHg with 11.2 SD respectively. Mean magnesium level was 1.9 mmol/L with 2.2 SD.

Conclusions: Hypomagnesemia is present in eclamptic pregnant women. In developing countries like India, sufficient dietary supplementation should be given above the recommended dietary allowances in pregnancy at least in susceptible pregnant women.

Keywords: Eclampsia, Hypertension, Hypomagnesemia, Magnesium

INTRODUCTION

Triangle of hypertensive disorders, hemorrhage and infection leads to complicate the pregnancy approximately 2-10% and responsible for higher maternal mortality.¹⁻⁵ The data shows that due to hypertensive disorders in pregnancy, 16% of all maternal mortality in developed countries and 9% of maternal mortalities in Asia.^{6,7}

It is a pregnancy specific syndrome of reduced organ perfusion secondary to vasospasm and endothelial activation, characterized by hypertension and proteinuria

that may lead to multisystem involvement including renal, hematological, hepatic and cerebral impairment.^{8,9} Eclampsia become a common cause of maternal mortality nowadays and it is defined as generalized tonic clonic seizures and/or coma in a pregnancy complicated with hypertension.^{9,10} Magnesium plays an valuable role in neurochemical transmission and peripheral vasodilatation.¹¹ Blood pressure is affected by magnesium level by modulating vascular tone and structure through its effects on myriad biochemical reactions that control vascular contraction/dilation, growth/apoptosis, differentiation and inflammation. Additionally, deficiency of this mineral has been

previously related to oxidative stress, proinflammatory state, endothelial dysfunction, platelet aggregation, insulin resistance and hyperglycemia.¹²

Thus, magnesium may be physiologically important in blood pressure regulation whereas changes in magnesium levels could contribute to the patho-etiology of hypertension.¹³ So, the present study was carried out with the objective to study the level and effect of magnesium in eclamptic pregnant women.

METHODS

This cross-sectional study included 50 pregnant women between 20-35 years of age, attending Gynaecology OPD/admitted in Gynaecology wards in tertiary care hospital, Ahmedabad, Gujarat. Study was conducted among 50 clinically diagnosed women with eclampsia in their third trimester of pregnancy represented as study group during April 2011 to March 2013 after permission of Institutional Ethical Committee (IEC).

Inclusion criteria

- Females with singleton pregnancy, all in the third trimester which were diagnosed to have PIH based on the development of hypertension for the first time, proteinuria with or without edema, with no history of previous urinary tract troubles and no evidence of UTI.

Exclusion criteria

- Pregnant ladies with medical complications such as renal disease, trophoblastic disease, heart disease, chronic hypertension and on magnesium sulphate drugs.

Thorough clinical examination was carried out before recruiting the participants for the study by a competent gynecologist. Personal and clinical information regarding age, gestational age, socioeconomic status, education, dietary habit, clinical and biochemical parameters were recorded with the help of a questionnaire, with prior consent of the participant.

Sample collection and estimation of serum magnesium: 5ml blood was drawn from antecubital vein in a sterile syringe and was transferred to a clean dry vial slowly by the side of the vial after removing the needle to avoid hemolysis. The blood was allowed to clot at room temperature for 30 minutes and serum was separated by centrifugation at 3000 rpm for 10 minutes. Serum magnesium was estimated by atomic absorption spectrophotometer (AA-7000) by the method described by Fernandez et al.¹⁴

For the determination of magnesium, the serum was diluted 1:50 with 0.1% (w/v) lanthanum (as chloride) diluent. The dilution ratio was adjusted to ensure that

concentration falls within a suitable absorbance range. To analyse the data, Students' t-test was employed wherever applicable to assess the significance of difference among control and study subjects. All the statistical tests were performed in Epi Info 3.5.1 software by CDC, USA.

RESULTS

Table 1 shows that mean age of study participants was 24.3 years with 5.1 SD. Mean gestational age, mean total hospital stays, mean BMI, mean systolic BP and diastolic BP was 36.4 week with 3.3 SD, 7.8 days with 2.4 SD, 28.9 weight/ht² with 4.8 SD, 146.5 mmHg with 14.7 SD and 95.9 mmHg with 11.2 SD respectively.

Table 1: Socio-clinical parameters of study participants (N=50).

Variables	Mean±SD
Age (in years)	24.3±5.1
Gestational age (in week)	36.4±3.3
Total Hospital Stay (in days)	7.8±2.4
BMI (in weight/ht ²)	28.9±4.8
Systolic BP (in mmHg)	146.5±14.7
Diastolic BP (in mmHg)	95.9±11.2

Figure 1 shows that 44.0% participants have magnesium level was 1.5 to 2mmol/L. Around 20.0%, 18.0%, 16.0% and 2.0% participants have magnesium level was 1 to 1.5mmol/L, ≥2mmol/L, 0.5 to 1mmol/L and 0 to 0.5mmol/L respectively.

Mean magnesium level was 1.9mmol/L with 2.2 SD.

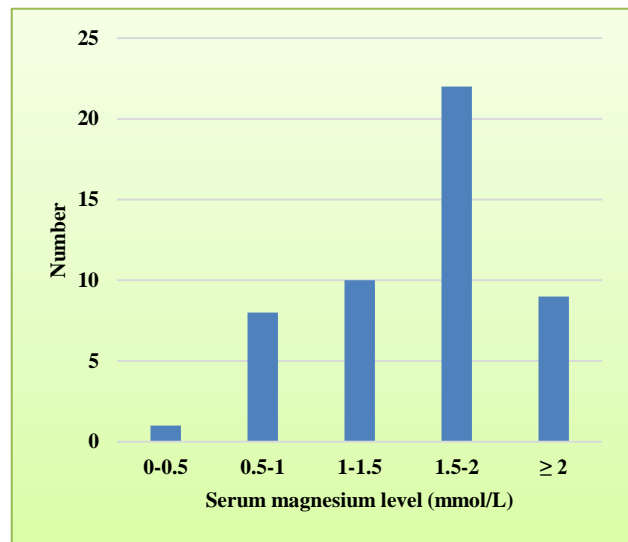


Figure 1: Serum magnesium levels of study participants (N=50).

Figure 2 shows that absent knee jerk, ≥1 proteinuria, edema, altered RS, altered CNS, maternal mortality and still birth observed in 12.0%, 78.0%, 62.0%, 24.0%, 36.0%, 2.0% and 18.0% respectively.

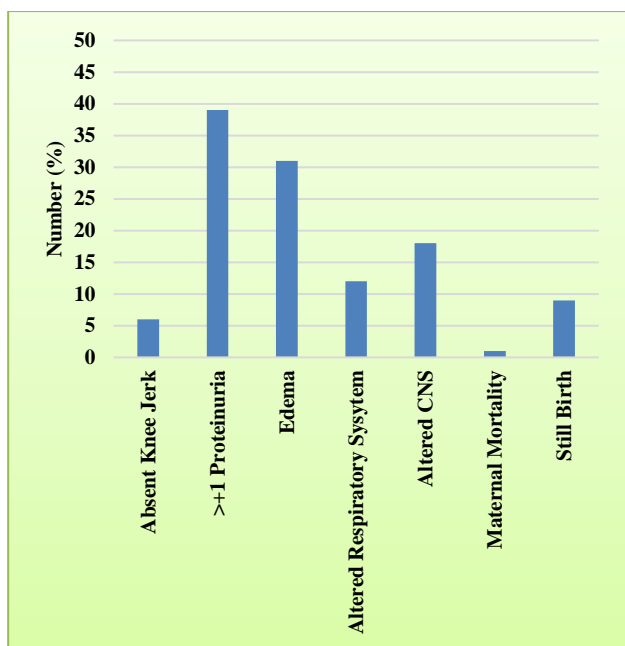


Figure 2: Clinical observation among study participants (N=50).

DISCUSSION

Serum magnesium level during pregnancy decreased due to hemodilution effect of estrogen and increased demand of fetus. In condition of eclampsia, urinary excretion of magnesium also increases. Hemodilution, altered renal clearance and consumption of minerals by growing fetus are connected with the hypomagnesemia.^{1,11} Present study observed mean maternal age was 24.3 years which is comparable with the study done by Shamsi U and Taviana Z et al.^{15,16} But higher mean maternal age was observed in study done by Darkwa EO et al, Ganesh KS et al and Corrie MW et al.^{6,17,18} Although this is a well-established fact that preeclampsia and eclampsia are more prevalent in extremes of age.¹⁹ Pregnant women of age less than 20 year were higher risk of developing preeclampsia compared to age of more than 20 year.^{20,21} Higher BMI and early gestational age specially in first delivery increase the risk of recurrence preeclampsia. Present study observed mean BMI higher among study participants.²² This finding is correlate with the study done by Sohlberg S et al, Poorolajal J et al, Mrema D et al, Cnattingius S et al, Thadhani R et al, Sebire NJ et al, Bodnar LM. et al and Bhattacharya S. et al. Present study observed higher diastolic and systolic blood pressure among study participants.²³⁻³⁰

Present study observed most of participants belonged to magnesium level group of 1.5 to 1mmol/L. Mean magnesium level was 1.9mmol/L. Serum Mg is intracellular ions mainly required for cellular metabolism such as muscles contractibility, secretion, neuronal activity as well as cellular death. Moreover, reduction in serum Ca, Mg and zinc during pregnancy has been attributed as a possible contributor among the various

aetiologies of eclampsia, therefore supplementation of these elements in diet may be of high value to prevent this devastating condition.³ This finding is correlate with the study done by Chaudhari RK, Kanagal DV et al, Ephram RK, Vafaei H et al, Pairu J et al, Abdellah A et al, Ibraheem A et al and Akhtar S et al.³¹⁻³⁷

CONCLUSION

The result of the present study suggests that hypomagnesemia is present in eclamptic pregnant women. In developing countries like India, sufficient dietary supplementation should be given above the recommended dietary allowances in pregnancy at least in susceptible pregnant women. The results may be significant in understanding the possible contribution of serum magnesium in the pathophysiological process of preeclampsia and may help in developing the strategies for prevention and early diagnosis.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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