

SIGNIFICANCE OF SERUM MAGNESIUM IN PREGNANCY¹*Dr. A. Mary Chandrika, ²Dr. V. S. Kalai Selvi¹Assistant Professor, Department of Biochemistry, Sree Balaji Medical College and Hospital.²Professor, Department Of Biochemistry, Sree Balaji Medical College and Hospital.
Sree Balaji Medical College and Hospital, No.7 Works Road, Chrompet, Chennai – 600044.***Corresponding Author: Dr. A. Mary Chandrika**

Assistant Professor, Department of Biochemistry, Sree Balaji Medical College and Hospital.

Article Received on 10/12/2018

Article Revised on 31/12/2018

Article Accepted on 20/01/2019

ABSTRACT

Introduction: Magnesium is an essential mineral in pregnancy that helps to build and repair the body's tissues. Magnesium deficiency in pregnancy commonly occurs because of inadequate and low intake of magnesium. Symptoms of magnesium deficiency include insomnia, muscle twitching, nausea, loss of appetite, fatigue, weakness and poor memory. These early symptoms of magnesium deficiency in pregnancy usually remain undiagnosed which leads to severe deficiency, complicating pregnancy. A minimal decrease in magnesium level in pregnancy leads to severe muscle cramps and morning sickness whereas severe magnesium deficiency may lead to pre-eclampsia, poor foetal growth, and even infant mortality. **Aim:** To study the significance of serum magnesium in pregnancy. **Materials And Methods:** This case-control study included 60 cases of pregnant women in first, second and third trimester and 20 age matched non-pregnant women as control group attending outpatient department of Obstetrics And Gynaecology in Sree Balaji Medical College and Hospital, Chennai. After obtaining informed consent from the subjects, venous blood samples were collected by standard aseptic techniques. Serum was separated and magnesium level was estimated. Data was statistically analysed by using SPSS version 18. **Results:** There was a fall in serum magnesium level in the pregnant women as compared to the non-pregnant controls ($p < 0.0001$). This decreased serum magnesium level had manifested with severe muscle cramps in about 16% of pregnant women. **Conclusion:** Hypomagnesaemia is prevalent in pregnancy. Dietary supplementation of magnesium in the form of sesame seeds, pumpkin seeds, spinach, swiss chard, sunflower seeds, fish, whole grains, leafy green vegetables, and legumes helps to avoid magnesium deficiency, thereby preventing the later complications of magnesium deficiency like pre-eclampsia.

KEYWORDS: magnesium deficiency, pregnancy, muscle cramps.**INTRODUCTION**

Magnesium is an important mineral required for - regulation of body temperature, nucleic acid and protein synthesis and in maintaining nerve and muscle cell electrical potentials.^[1] Many pregnant women are found to have low intakes of magnesium. Magnesium deficiency occurs due to inadequate magnesium in diet, intestinal malabsorption and increased loss through gastrointestinal or renal systems.^[2] The initial signs of magnesium deficiency in pregnancy mimics common pregnancy problems like back pain, muscle cramps, constipation, irritability, muscle tightness, insomnia, migraines and headache. Severe magnesium deficiency can lead to pre-eclampsia, poor foetal growth and foetal death. Research suggests that proper levels of magnesium during pregnancy helps to keep the uterus from contracting prematurely, reduce foetal growth restriction, pre-eclampsia, and increase birth weight.

AIM: To study the significance of serum magnesium in pregnancy.**OBJECTIVES:** To estimate the magnesium levels in pregnant women and compare it with non-pregnant women.

To find the prevalence of magnesium deficiency in pregnancy.

To find the presence of symptoms of magnesium deficiency in pregnancy.

MATERIALS AND METHODS

This case control study was carried out in Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu for a period of 11months between July 2015 to May 2016. This case-control study consisted of 60 cases of pregnant women in first, second and third trimester and 20 age matched non-pregnant women as control group

attending the outpatient department of Obstetrics And Gynaecology in Sree Balaji Medical college and Hospital, Chennai, Tamil Nadu. This study was carried out after getting ethical clearance from the institution. This study was undertaken to evaluate the serum magnesium level in pregnancy and to determine the prevalence of hypomagnesaemia in pregnancy at the earliest and thus prevent the pregnant women from progression to severe magnesium deficiency. After obtaining informed consent from the subjects, venous blood samples were collected under standard aseptic techniques. Serum was separated and magnesium level was analysed by Xylidyl Blue method in Mindray autoanalyser. Magon or xylidyl blue [1-azo-2-hydroxy-3-(2,4-dimethylcarboxanilido)-naphthalene -1'-(2 -hydroxybenzene)] binds with magnesium in alkaline solution and forms a red coloured complex.^[3] which leads to a spectral shift. Absorbance is measured in 600nm. Data was statistically analysed using the

Statistical Package for the Social Sciences (SPSS) version 18.

Inclusion Criteria

Case group - pregnant women of age group 20-30 years in first, second and third trimester.

Control group – Healthy non pregnant women of age group 20-30 years.

Exclusion Criteria

Pregnant women with hyperemesis gravidarum, pregnancy induced hypertension and severe vomiting.

RESULTS

Normal serum magnesium levels in pregnancy is I trimester - 1.6 - 2.2mg/dl, II trimester - 1.5 - 2.2mg/dl, III trimester - 1.1- 2.2mg/dl.^[4] Non-pregnant women - 1.5 to 2.3mg/dl.

Table 1: Serum magnesium levels in the pregnant and non pregnant subjects.

Sl. No.	Groups	n	Average Age (in years)	Serum Magnesium Level (mg/dl) (Mean \pm SD)	No Of Subjects With Low Magnesium Level
1.	GROUP I (pregnant women in I trimester)	20	24 years	1.3710 \pm 0.2664	17
2.	GROUP II (pregnant women in II trimester)	20	25 years	1.3905 \pm 0.2534	12
3.	GROUP III (pregnant women in III trimester)	20	27 years	1.3715 \pm 0.2608	5
					Total = 34 (52.66% ~57%)
4.	GROUP IV (Non – pregnant women)	20	24 years	2.1075 \pm 0.4811	2

Table 1 shows average serum magnesium levels (decreased) in I and II trimester (1.3710 \pm 0.2664), (1.3905 \pm 0.2534) whereas average serum magnesium levels remain normal in non-pregnant women (2.1075 \pm 0.4811).

Out of the 60 pregnant women 34 had reduced serum magnesium levels. And of 20 controls only 2 had decreased serum magnesium levels.

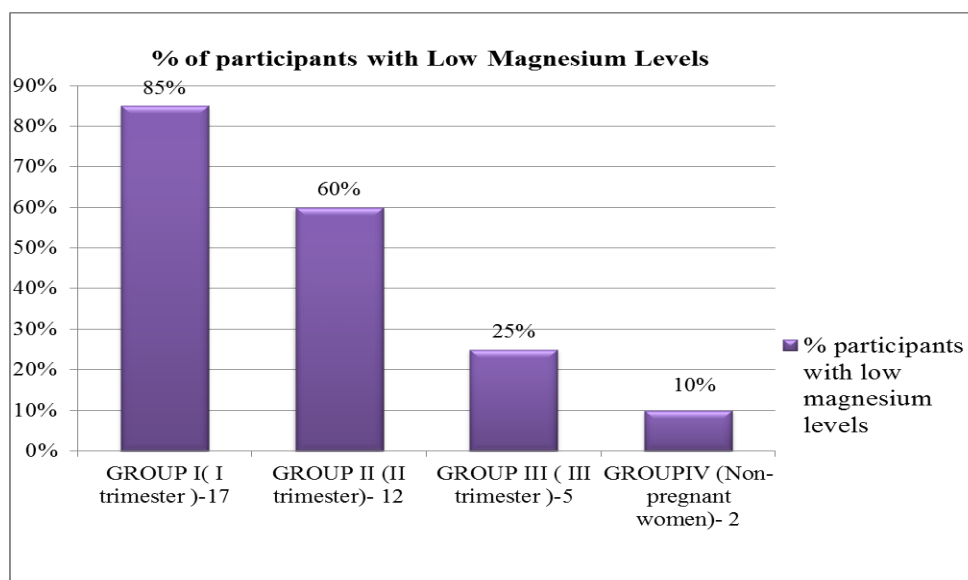


Figure 1: Percentage of participants having low magnesium levels.

This study also shows that total of 57% pregnant women and 10% non-pregnant women had decreased serum magnesium levels.

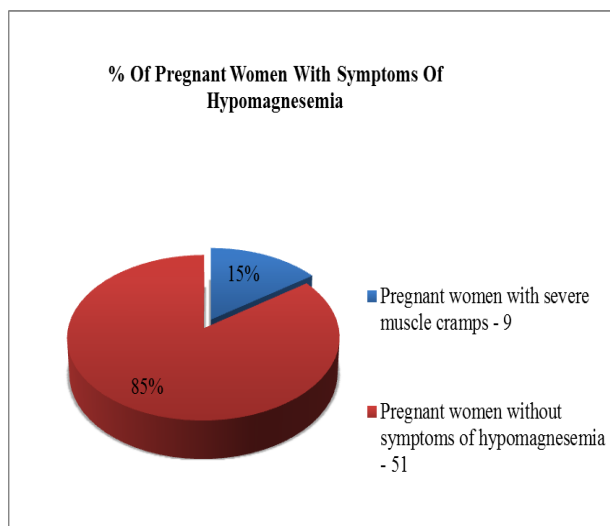


Figure 2: Percentage of pregnant women with symptoms of hypomagnesaemia.

This decreased serum magnesium level had manifested with severe muscle cramps in about (n=9) 15% in pregnant women of all trimesters.

This study has a significant statistical correlation with p-value < 0.0001 and confidence interval of 95%.

DISCUSSION

This study shows that 57% pregnant women have decreased magnesium level in the antenatal period. Enaruna *et al.*, in their study has also stated 16.5% of magnesium deficiency in pregnancy,^[5] and also another study which measured serum magnesium level in low-risk pregnancies stated that both ionized and total serum Mg were significantly reduced after the 18th week of gestation when compared with magnesium level in other weeks of gestation.^[6]

P. Pathak *et al.*, in their study conducted among pregnant women in a rural community has stated that 44% of antenatal women in India has hypomagnesaemia.^[7] One of the main reason for decreased magnesium levels in pregnancy may be reduced intake of magnesium rich diet. Studies done on dietary intake during pregnancy has demonstrated that most of the women in low income group has decreased intake of magnesium in their antenatal period.^[8] Denguezli *et al.*, in their study has mentioned that antenatal women consume less magnesium of about 285.2 mg/day than the required amount.^[9] This hypomagnesaemia leads to chronic hypertension, preeclampsia, placental dysfunction, and premature labor in pregnant women.^[10] mother and many serious complications in fetus. There are various other studies showing decreased magnesium level as the important cause for pregnancy induced hypertension and pre-eclampsia, Richard Kobina Dadzie Ephraim *et al.*,

has also stated the same in their study.^[11] Adequate magnesium is recommended for the well being of both the mother and the baby.^[11] Conradt A *et al.*, in their retrospective study has reported that reduced risk of fetal growth retardation and preeclampsia were noted with magnesium supplementation during pregnancy.^[12] A Cochrane review and recommendations by the WHO on prevention and management of pre-eclampsia and eclampsia have mentioned that risk of pre eclampsia can be reduced by giving calcium and magnesium during antenatal period.^[13]

CONCLUSION

Prevalence of hypomagnesaemia in pregnancy is 57% and hence, magnesium supplementation or magnesium-rich diet consisting of green leafy vegetables, soy milk, fish and legumes may improve outcome.

CONFLICT OF INTEREST

None declared.

AFFILIATIONS

Sree Balaji Medical College and Hospital

REFERENCES

- Makrides M, Crosby DD, Bain E, Crowther CA. Magnesium supplementation in pregnancy Cochrane Database Syst Rev., 2014; (4): C: CD000937.
- Seelig MS. Magnesium Deficiency in the Pathogenesis of Disease: Early Roots of Cardiovascular, Skeletal, and Renal Abnormalities. Newyourk, Springer Science and Business Media, 1980.
- Carl A. Burtis, Edward R. Ashwood, David E. Bruns, Tietz textbook of Clinical Chemistry and Molecular Diagnostics, fifth edition, "Bone and Mineral metabolism" Pg-1754.
- Abbassi-Ghanavati M, Greer LG, Cunningham FG. Pregnancy and laboratory studies: a reference table for clinicians. *Obstet Gynecol*, 2009 Dec; 114(6): 1326-31. PMID:19935037.
- Clinical significance of low serum magnesium in pregnant women attending the University of Benin Teaching Hospital. Enaruna NO, Ande A, Okpere EE. *Niger J.Clin Pract*, 2013 Oct-Dec; 16(4): 448-53. doi: 10.4103/1119-3077.116887.
- Arikan G, Guecer F, Schoell W, Weiss P. Preterm labour during oral magnesium supplementation in uncomplicated pregnancies. *Geburtshilfe Frauenheilkd*, 1997; 57: 491-5.
- P. Pathak, S. K. Kapoor, U. Kapil, and S. N. Dwivedi, "Serum magnesium level among pregnant women in a rural community of Haryana State, India," *European Journal of Clinical Nutrition*, 2003; 57(11): 1504-1506.
- Luke B. Nutrition During Pregnancy: Part I, Weight Gain; Part II, Nutrient Supplements. *JAMA*. 1991; 265(2): 281-2.

9. W. Denguezli, R. Faleh, A. Hajjaji et al., "Maternal nutrition as a determinant of fetal weight: role of trace elements and vitamins," *Journal de Gynecologie Obstetrique et Biologie de la Reproduction*, 2007; 36(5): 473–478.
10. Wynn A, Wynn M. Magnesium and other nutrient deficiencies as possible causes of hypertension and low birthweight. *Nutr Health*, 1988; 6: 69–88.
11. Richard Kobina Dadzie Ephraim, Derick Nii Mensah Osakunor, Seth Wiredu Denkyira, Henrietta Eshun, Samuel Amoah, and Enoch Odame Anto "Serum calcium and magnesium levels in women presenting with pre-eclampsia and pregnancy-induced hypertension: a case-control study in the Cape Coast metropolis, Ghana" *BMC Pregnancy Childbirth*, 2014; 14: 390. Published online 2014 Nov 20. doi: 10.1186/s12884-014-0390-2.
12. Conradt A, Weidinger H, Algayer H. On the role of magnesium in fetal hypotrophy, pregnancy induced hypertension and pre-eclampsia. *Magnes Bull*, 1984; 6: 68–76.
13. WHO recommendations for Prevention and treatment of pre-eclampsia and eclampsia. 2011 [http://www.who.int/reproductivehealth/publications/maternal_perinatal_health/9789241548335/en/index.html]