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Serum Magnesium Level During Pregnancy

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Abstract: This observational study was conducted in the department of Physiology LUMHS Jamshoro with collaboration of GU-IV Liaquat U niversity Hospital Jamshoro from January 2008 to December 2008. The inclusion criteria of the study were pregnant women with 20-35 years of age, primigravida, had 2nd and 3rd trimester of pregnancy and willing for follow-up. The questionnaire comprised of sections to elicit the information regarding the general bio-data of the patient as well as specific information. The informed consent was taken from all participants participated in the study and the grouping was made according to serum magnesium level, trimester of pregnancy and age of women. After taking detailed history, clinical examination and ultrasound examination, blood sample collected for serum Mg++ level and other routine tests and sent to laboratory for analysis. The data was analyzed in SPSS version 11.00. Total of 150 patients were selected in this study. The age of patients were from 21 to 35 years with mean + SD 25.8 + 3.29 in Group I and 30.1 + 4.36 in Group II (P = < 0.001). Group I of 75 (50%) were those pregnant women who had low serum magnesium (Hypomagnesemia) level less than 1.5mg/dl with mean + SD 1.16 + 0.22 while Group II of. 75 (50%) were those having magnesium level within normal range from 1.8 - 2.9mg/dl with mean + SD 1.94 + 0.30 (P = < 0.001). Out of 150 pregnant women 60 (40%) were in their 2nd trimester and 90(60%) in 3rd trimester. Out of 60 in 2nd trimester, 35(58.3%) having low serum magnesium level (below reference range of 1.8 mEq/ L), while remaining 25 (41.7%) had normal serum magnesium level. Out of 90 in 3rd trimester, 40 (44.4%) had low serum magnesium level while remaining had serum magnesium level within normal range of 1.8 -2.9 mg/dl with non-significant P value (0.13). The present study identified hypomagnesaemia in pregnant ladies.

Key words: Hypomagnesaemia · Magnesium · Pregnancy

INTRODUCTION

Magnesium is a chemical element with a symbol of Mg++, atomic number 12 and atomic mass 24.3. The name originates from the Greek word Magnesia, a district in Thessaly [1]. Magnesium was discovered about the same time as aluminum. Sir Humphrey Davy, the great British [Cornish] chemist, first isolated aluminum in 1807 and discovered magnesium in 1808. Davy also discovered many metals. Faraday produced magnesium metal by electrolysis of fused anhydrous magnesium chloride in 1833 [1]. Magnesium ions are essential to all living cells; it plays an important role in the structure and function of the human body. It is the fourth most abundant mineral in the body and is essential to good health. Approximately 50% of total body magnesium is found in bones and the other half is found predominantly inside cells of body tissues and organs. Only 1% of magnesium is found in blood, but the body works very hard to keep blood levels of magnesium constant [2].

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The pregnancy is a hyper metabolic state. It is the demand of fetus which may have ill effects on the mother's health to carry out its vital functions, like growth and development of fetus.To fulfill these demands alongwith increasing diet supplements are also added during pregnancy like iron, calcium, vitamins and minerals. Among which Mg++ is one of the important minerals [3] which is required for cell multiplication in a growning fetus and is an essential element of life chemistry in keeping a balanced neuro muscular system. The importance of mineral balance during pregnancy is still under consideration. Research demonstrates that trace elements and minerals are critical for the development of fetus. Magnesium plays an important role during pregnancy, pregnant women tend to have low blood magnesium level than non pregnant because of increase demand for mother and growing fetus and increase renal excretion of magnesium 25% more than non-pregnant women due to increase in GFR and haemodilution in 2nd and 3rd trimester [3, 4]. The magnesium deficiency during pregnancy may cause hypertension, IUGR, pre-eclampsia, preterm labour, low birth weight babies and leg cramps [5].

Therefore this study was conducted to observe the serum magnesium level during pregnancy because magnesium deficiency in pregnant ladies will leads to life threatening complications for mother as well as their babies.

MATERIALS AND METHODS

This observational study was conducted in the department of Physiology LUMHS Jamshoro with collaboration of GU-IV Liaquat university Hospital Jamshoro from January 2008 to December 2008. In this study pregnant women visiting gynaecology out patient department (OPD) and in patient department (IPD) were studies. The inclusion criteria of the study were pregnant women with 20-35 years of age, primigravida, had 2nd and 3rd trimester of pregnancy and willing for follow-up. The exclusion criteria of the study were; multipraous women, 1st trimester of pregnancy, history of hypertension (essential), known diabetics, anemia (moderate and severe), tuberculosis, cardiac disease, multiple pregnancy (Twin, Triplet), hyper emesis gravidarium not responding to treatment, history of congenital malformation in family, congenital malformation in current pregnancy as diagnosed by ultra sound, history of smoking or any drug abuse, molar pregnancy, less than 20 years and more than 35 years of age and history of drugs that interfere with magnesium absorption. The informed consent was taken from all paticipants participated in the study and the grouping was made according to serum magnesium level, trimester of pregnancy and age of women. The data were collected on the preformed questionnaire. The questionnaire comprised of sections to elicit the information regarding the general bio-data of the patient as well as specific information. The section of specific information comprised of patients weight gain during pregnancy, blood pressure recording, edema, abdominal examination, ultrasound finding and serum magnesium level. After taking detailed history, clinical examination and ultrasound examination, blood sample collected for serum Mg++ level and other routine tests and sent to laboratory for analysis. After collection and centrifuging the sample, serum was obtained. Serum Mg++ was estimated by an end-point colorimetric method by Cobas Mira Roche Diagnostic System Analyzer. The method is based on the reaction of magnesium with xylidyl blue in alkaline solution containing GEDTA (Glycol ether diamine tetra acetic acid)to mask the calcium in the sample. Briefly, 50 µL of each serum sample were added to 400 µL of buffer 1 (Tris-hydroxymethyl) aminomethane/6-aminocapronic acid, pH 11.25, 500 mmol/L and GEDTA 90 µmol/L). Then, buffer 2 containing xylidyl blue 0.28 mmol/L was added. In alkaline solution Mg++ forms a purple complex with xylidil blue, a diazonium salt. The data was evaluated in statistical program SPSS version 11.0. The student t test (Independent sample t test) was applied to compare the means (2 - tailed) among the numerical variables i.e. serum magnesium, age (in years) and blood pressure. The Fisher's exact test was used among the categorical parameters and age group to compare it with dependent variable (Hypo and Normal Mg++ level) and calculated their frequency and percentages at 95% confidence interval. The P value = 0.05 was considered as statistically significant

RESULTS

Total 150 patients were selected in this study. The age of patients were from 21 to 35 years (Table No. 1) with mean ± SD 25.8 ± 3.29 in Group I and 30.1 ± 4.36 in Group II (P = < 0.001) (Table No. 2)

Group I of 75 (50%) were those pregnant women who had low serum magnesium (Hypomagnesemia) level less than 1.5mg/dl with mean ± SD 1.16 ± 0.22 while Group II

Table 1: Distribution of pregnant women according to age group(n = 150)

Age Group	n(%)
Group I: 21 - 30 years	100(66.6%)
Group II: 31 - 35 years	50(33.3%)

Table 2: Demographic characteristics of pregnant women

		Serum Magnesium (n = 150)		
	Range	Hypo n = 75 (mean ± SD)	Normal n = 75 (mean ± SD)	P value
Age (in years)	21-35	25.8±3.29	30.1±4.36	< 0.001*
Blood Pressure:				
Systolic	90-160	121.5±16.54	126.0±18.58	0.12
Diastolic	50-110	78.0±13.43	81.7±13.21	0.08

Results are expressed as Mean ± Standard Deviation

* *P* value is statistically highly significant

Table 3: Comparison of Serum Magnesium Level among the Hypo and Normal subjects

	Group		
	Hypo n = 75(%)	Normal n = 75(%)	P value
Serum Magnesium Level in mg /dL	1.16 ± 0.22	1.94 ± 0.30	< 0.001*

Results are expressed as Mean ± Standard Deviation

* *P* value is statistically highly significant

Table 4: Distribution of pregnant women according to trimester of pregnancy having low and normal serum Magnesium Level

	Serum Magnesium (n = 150)		
	Hypo n = 75	Normal n = 75	P value
Trimester of pregnancy:			
2ND trimester	35(58.3%)	25(41.7%)	
3RD trimester	40(44.4%)	50(55.6%)	0.13*

* *P* value is statistically non significant

of. 75 (50%) were those having magnesium level within normal range from 1.8 - 2.9mg/dl with mean ± SD 1.94 ± 0.30 (P = < 0.001) (Table 3).

Out of 150 pregnant women 60 (40%) were in their 2nd trimester and 90(60%) in 3rd trimester. Out of 60 in 2 nd trimester, 35(58.3%) having low serum magnesium level (below reference range of 1.8 mEq/ L), while remaining 25 (41.7%) had normal serum magnesium level. Out of 90 in 3rd trimester, 40 (44.4%) had low serum magnesium level while remaining had serum magnesium level within normal range of 1.8 -2.9 mg/dl with non-significant P value (0.13) (Table 4).

DISCUSSION

In pregnancy micronutrients including magnesium are important for normal growth and development of baby. Deficiency of magnesium in mothers can impact not only the health of mother but their babies too. The formation of new tissue (maternal and fetal) during pregnancy requires high magnesium intakes than that of the normal non pregnant women of comparable age [6]. The magnesium deficiency in pregnant women is an important risk factor for the complications which, can be prevented by timely detection and proper management. This data support that magnesium has an important role for safe maternal and fetal outcome. Magnesium supplementation is important for prevention of pregnancy associated complications.

A hospital-based study documented magnesium deficiency in 4.6% of all pregnant women included in the study from urban slum communities. [7]. The prevalence of magnesium deficiency may be higher in the present study possibly due to the difference in the dietary pattern and different cutoffs utilized to define magnesium deficiency status

In the present study, there was a decrease in serum magnesium with the increase in parity. An earlier study reported that frequent cycles of reproduction exert a significant stress leading to a greater risk of undernutrition among the pregnant women [8]. The haemodilution during the last trimester of pregnancy could be another contributing factor leading to a higher prevalence of deficiency of magnesium. Earlier studies have also reported similar findings [9-11]. The findings of the present study indicate a high prevalence of magnesium deficiency among pregnant women. There is a need for conducting multicentric studies in different regions of the country to document further the status of magnesium deficiency among pregnant women in Pakistan

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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