Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(3), 2749-2757 | ISSN:2251-6727

Clinical Significance of Low Serum Magnesium in Pregnant Women – A Hospital based Descriptive Analytical Cross-Sectional Study

Dr Shifana Shahani Kaisery M,[1] Dr Sarojamma Chunchaiah,[2*] Dr MPA Sailakshmi[3]

[1]Postgraduate Junior Resident, Department of Obstetrics and Gynaecology, Rajarajeswari Medical College and Hospital, Bangalore

[2]Professor, Department of Obstetrics and Gynaecology, Rajarajeswari Medical College and Hospital, Bangalore

[3]Professor and Head of Department, Department of Obstetrics and Gynaecology, Rajarajeswari Medical College and Hospital, Bangalore

(Received: 16 March 2025 Revised: 20 April 2025 Accepted: 15 June 2025)

KEYWORDS

Pregnancy, Magnesium, Hypomagnesemia, Adverse outcomes, Neonatal outcomes, India

ABSTRACT:

Background: Hypomagnesemia has been implicated in a variety of adverse pregnancy outcomes such as preeclampsia, gestational hypertension, preterm labour, and fetal growth restriction.

Objectives: To estimate the levels of serum magnesium and thereby the proportion with hypomagnesemia among pregnant women presenting to a tertiary healthcare facility; and to determine the association between serum magnesium levels and pregnancy outcomes.

Methods: This was a hospital based descriptive analytical cross-sectional study conducted in the Department of Obstetrics and Gynaecology, Rajarajeswari Medical College and Hospital, Bangalore among pregnant women (18-35 years of age) with gestational age more than 28 weeks in true labour using a purpose predesigned, semi structured, pretested questionnaire that included a detailed clinical history, examination, and investigations (complete antenatal profile, ultrasound, and serum magnesium levels).

Results: The study included a total of 250 participants. The prevalence of hypomagnesemia was 21.2%; mean (SD) levels of magnesium was 0.93 (0.1) in patients with low levels of magnesium and 1.65 (0.3) in patients with normal levels of magnesium – a statistically significant difference ($p<0.05$). The tests of association found that socioeconomic status, parity, and gestational age (in weeks) were significantly associated with hypomagnesemia ($p<0.05$). However, age (in years), blood pressure, haemoglobin (gm/dl) and oral glucose challenge test (OGCT) values were statistically insignificant ($p>0.05$). Importantly, it was found that pregnant women with hypomagnesemia were at increased risk of maternal complication during pregnancy and in labour, caesarean section, and low birthweight infants in comparison with pregnant women having normal levels of magnesium ($p<0.05$). However, the APGAR scores were not statistically associated with levels of serum magnesium ($p>0.05$).

Conclusion: To mitigate the risks and enhance the health of expectant mothers and their babies, healthcare providers should consider routine monitoring of magnesium levels in pregnant women.

Introduction

Pregnancy is a physiologically demanding period characterized by significant changes in maternal metabolism and nutrient requirements to support fetal growth and development.(1) Among the essential minerals crucial for maternal and fetal health, magnesium plays a pivotal role in numerous cellular and physiological processes, including protein synthesis, energy metabolism, and neuromuscular function.(2) Maintaining adequate magnesium levels during pregnancy is paramount, as magnesium deficiency (hypomagnesemia) has been implicated in a variety of adverse pregnancy outcomes such as preeclampsia,

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(3), 2749-2757 | ISSN:2251-6727

gestational hypertension, preterm labour, and fetal growth restriction.(3-5) The pathophysiology underlying these associations involves various physiological processes influenced by magnesium deficiency including,

1. Uterine function and contractility: Magnesium plays a crucial role in regulating smooth muscle function, including the uterine muscle. In pregnancy, magnesium acts as a natural calcium antagonist, helping to maintain uterine muscle relaxation. However, inadequate magnesium levels can disrupt this balance, leading to increased uterine irritability and hypercontractility. This heightened uterine contractility can predispose pregnant women to complications such as preterm labour, premature rupture of membranes, and subsequent preterm birth.(6)
2. Vascular tone and blood pressure regulation: Hypomagnesemia is also associated with alterations in vascular tone and endothelial function. Magnesium deficiency can impair endothelial-mediated vasodilation and promote vasoconstriction, contributing to the development of hypertensive disorders of pregnancy, such as preeclampsia and gestational hypertension.(7)
3. Insulin sensitivity and glucose metabolism: Magnesium is involved in insulin secretion and action, and its deficiency can disrupt glucose metabolism and insulin sensitivity. Pregnant women with hypomagnesemia may experience impaired glucose tolerance and gestational diabetes mellitus (GDM). GDM is associated with adverse pregnancy outcomes, including macrosomia, birth trauma, neonatal hypoglycaemia, and an increased risk of developing type 2 diabetes mellitus later in life.(8)
4. Fetal growth and development: Adequate magnesium levels are essential for fetal growth and development, as magnesium is involved in DNA and RNA synthesis, protein synthesis, and cellular proliferation. Maternal magnesium deficiency can compromise fetal growth, leading to intrauterine growth restriction (IUGR) and low birth weight.(9)
5. Magnesium deficiency during pregnancy can also affect neurological development and neonatal outcomes. Magnesium is involved in neuronal excitability and neurotransmitter release, and its deficiency may contribute to neurodevelopmental disorders in the offspring. Additionally, maternal hypomagnesemia has been associated with adverse neonatal outcomes such as hypotonia, respiratory depression, and neonatal seizures, which can impact neonatal morbidity and require intensive medical management.(10)

Despite its clinical significance, the prevalence of hypomagnesemia among pregnant women and its association with pregnancy outcomes remain areas of ongoing research and clinical interest in the Indian context. The findings may inform clinical practice guidelines, enhance prenatal screening protocols, and guide targeted interventions to optimize maternal and neonatal health outcomes. Against this background, the objectives of the present study were to estimate the levels of serum magnesium and thereby the proportion with hypomagnesemia among pregnant women presenting to a tertiary healthcare facility; and to determine the association between serum magnesium levels and pregnancy outcomes.

Materials and Methods

This was a hospital based descriptive analytical cross-sectional study conducted in the Department of Obstetrics and Gynaecology, Rajarajeswari Medical College and Hospital, Bangalore between April, and May 2024. The study was approved by the Institutional Human Ethics Committee (IHEC). The Participant Information Sheet (PIS) was translated into the local language and given to the participants (and their attendants). The information was also verbally explained to them in their native language until they fully understood it. Participants were included in the study after they provided written informed consent. All pregnant women 18 to 35 years of age, presenting to the Department of Obstetrics and Gynaecology with gestational age more than 28 weeks in true labour were enrolled in the present study. However, women with multiple pregnancy; intrauterine growth restriction; known case of hypertension, diabetes, cardiac disease, renal disease, gastrointestinal disorders (including peptic

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(3), 2749-2757 | ISSN:2251-6727

ulcer disease), thyroid disorders, sickle cell anemia; with history of congenital malformations in the family/current pregnancy (as diagnosed by ultrasonography (USG)); with retroviral infection or acquired immune deficiency syndrome; with history of alcohol dependence, antacids, loop diuretics; and women with increased vomiting in pregnancy not responding to treatment were excluded from the present study.

Enaruna et al.(11) (2013) conducted a cohort study and noted the prevalence of hypomagnesemia to be 16.3%. Using this information, considering a power of 80% (or beta error of 20%), level of significance of 5% (two sided), absolute precision of 5%, and 10% non-response rate (attrition rate), the minimum estimated sample size was rounded off to 250 pregnant women in line with prespecified inclusion and exclusion criteria with 95% confidence. We used nonprobability sampling – convenience sampling technique to recruit the study participants. A purpose predesigned, semi structured, pretested questionnaire that included a sociodemographic information (age, socioeconomic status), detailed clinical history, examination, and investigations (complete antenatal profile, ultrasound, and serum magnesium levels) was used.

Five millilitres of venous blood were drawn from each patient to measure serum magnesium levels. The blood was placed in a 20-ml plain plastic container and quickly sent to the clinical chemistry laboratory. There, the serum was separated by centrifugation at 2000 rpm after clot retraction and then frozen at −80°C until it was analysed. The analysis was conducted using a direct measurement method (Calmagite method). The reference range for adults was established as 1.3-2.5 mEq/L. The outcomes of pregnancy including presence or absence of maternal complications during pregnancy and labour, mode of delivery (normal or assisted vaginal, lower segment caesarean section (LSCS)), birth weight (in kg), and APGAR scores (at 1 minute and 5 minutes) were noted.

The collected data was manually input into Microsoft Excel, where it was coded, recoded, and then analysed using SPSS version 23. Frequencies and percentages were used to summarize all categorical variables. Continuous variables were described using the mean (standard deviation) and/or median (interquartile range), depending on the results of data normality tests (Kolmogorov–Smirnov and Shapiro–Wilk tests). The Chi-square test or Fisher exact test was employed to determine statistical significance for categorical variables, while the independent t-test was used for continuous outcomes. A p-value of less than 0.05 was considered statistically significant.

Results

The present study included a total of 250 pregnant women, between 18 and 35 years of age, with gestational age more than 28 weeks in true labour.

Characteristics of the study participants: More than half the pregnant women enrolled in the present study were between 18 and 25 years of age; 14.0% were more than 30 years of age. More than two thirds (68.0%) of the pregnant women were of lower socioeconomic status whereas, 32.0% were of middle or upper socioeconomic status. Nearly half the patients (48.0%) were primiparous and 1.6% were grand multiparous. Based on gestational age (in weeks), 2.4% were less than 32 weeks, 24.0% were between 32 and 36 completed weeks, and 73.6% were between 37 and 42 weeks. More than two third pregnant women (69.6%) enrolled in the present study had complications during pregnancy. Also, the results showed that one in three women (33.2%) had complications in labour. The distribution of mode of deliveries showed that 51.6% women had normal or assisted vaginal deliveries and 48.4% had lower segment caesarean section. The mean (SD) birth weight was found to be 2.6 kilograms (0.5). The mean (SD) APGAR scores at 1 and 5 minutes was found to be 7.4 (0.7) and 8.8 (0.6) respectively.

Prevalence of hypomagnesemia: The prevalence of hypomagnesemia was 21.2%. The mean (SD) levels of magnesium in the present study was 1.29 (0.18), ranging between 0.80 and 2.20 – 0.93 (0.1) in patients with low levels of magnesium and 1.65 (0.3) in patients with normal levels of magnesium. This difference was found to be statistically significant ($p<0.05$).

Association between levels of magnesium and study variables: Of the 53 pregnant women with low levels of magnesium, 54.7% were between 18 and 25 years of age. A similar proportion of pregnant women (52.8%) with normal levels of magnesium were between 18 and 25 years of age. The distribution of women with low or normal levels of magnesium did not vary significantly by age ($p>0.05$). The results showed that 79.2% of women

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(3), 2749-2757 | ISSN:2251-6727

with low levels of magnesium were of lower socioeconomic status, in comparison with 65.0% having normal levels of magnesium – the difference was found to be statistically significant ($p<0.05$). Also, among women with low levels of magnesium 5.7% were grand multiparous, in comparison with 0.5% women with normal levels of magnesium – the difference was found to be statistically significant ($p<0.05$).

Among pregnant women with low levels of magnesium, 5.7% were less than 32 weeks gestational age, 43.4% were between 32 and 36 completed weeks, and 50.9% were between 37 and 42 weeks. Among pregnant women with normal levels of magnesium, 1.5% were less than 32 weeks gestational age, 18.8% were between 32 and 36 completed weeks, and 79.7% were between 37 and 42 weeks. The test of association showed that the difference in levels of magnesium by gestational age was found to be statistically significant ($p<0.05$).

The mean (SD) systolic blood pressure, diastolic blood pressure, haemoglobin, and oral glucose challenge test (OGCT) among pregnant women with low levels of magnesium was 118.3 mmHg (15.9), 79.6 mmHg (9.3), 10.5 gm/dl (2.1), and 100.6 gm/dl (23.4) respectively; among pregnant with normal levels of magnesium was 114.4 mmHg (13.6), 77.3 mmHg (10.2), 10.7 gm/dl (2.4), and 103. 2 gm/dl (18.5) respectively. However, the difference in systolic blood pressure, diastolic blood pressure, haemoglobin, and OGCT values between the study groups was not found to be statistically significant ($p>0.05$).

The results showed that among women with low levels of magnesium, 96.2% had complications during pregnancy; however, among women with normal levels of magnesium only 62.4% had complications during pregnancy – the difference was found to be statistically significant ($p<0.05$). Similarly, among women with low levels of magnesium, 81.1% had complications in labour; however, among women with normal levels of magnesium, only 20.3% had complications in labour – the associated with levels of magnesium and labour complications was found to be statistically significant ($p<0.05$). Regarding mode of delivery, only 35.8% women with low levels of magnesium had vaginal delivery in comparison with 55.8% women with normal levels of magnesium having vaginal delivery – a statistically significant difference ($p<0.05$).

The mean (SD) APGAR scores at 1 minute and 5 minutes among women with low levels of magnesium was 7.2 (0.8) and 8.7 (0.6) respectively; among women with normal levels of magnesium was 7.5 (0.6) and 8.8 (0.6) respectively. The differences in APGAR scores at 1 minute and 5 minutes between the study groups was not found to be statistically significant ($p>0.05$).

Discussion

The present study aimed to estimate the levels of serum magnesium among pregnant women presenting to a tertiary healthcare facility, as well as to determine the association between serum magnesium levels and pregnancy outcomes. The study included 250 pregnant women aged 18 to 35 years, with the majority being between 18 and 25 years. This age distribution is consistent with other studies conducted in similar settings, where early adulthood represents a common reproductive age group.(12) The socioeconomic status of the participants revealed that more than two-thirds (68%) belonged to the lower socioeconomic strata. Socioeconomic factors are known to influence maternal and neonatal outcomes,(13) often through mechanisms such as access to healthcare, nutritional status, and educational levels.(14) Nearly half (48%) of the women were primiparous, and a very small percentage (1.6%) were grand multiparous. Primiparity is often associated with a higher risk of complications during pregnancy and labour due to physiological and psychological factors.(15) The majority of participants (73.6%) were in the later stages of pregnancy (37-42 weeks gestational age), aligning with the typical timeframe for labour onset and delivery.

The study found that more than two-thirds (69.6%) of the participants had complications during pregnancy, and 33.2% experienced complications during labour. These rates are concerning and highlight the need for effective prenatal care and monitoring to manage and mitigate potential risks.(16) Common complications during pregnancy, such as preeclampsia, gestational diabetes, and preterm labour, can have profound effects on maternal and fetal outcomes. The mode of delivery was nearly equally distributed between normal or assisted vaginal deliveries (51.6%) and lower segment caesarean section (LSCS) (48.4%). This high rate of caesarean deliveries may reflect both elective and emergency procedures often necessitated by complications

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(3), 2749-2757 | ISSN:2251-6727

identified during pregnancy or labour.(17) The mean birth weight of 2.6 kg aligns with global averages but is on the lower end, potentially indicating intrauterine growth restrictions common in low socioeconomic populations.(18) The mean APGAR scores at 1 and 5 minutes were 7.4 and 8.8, respectively, indicating generally healthy neonatal outcomes despite the complications observed.

The study found the prevalence of hypomagnesemia to be 21.2% among the pregnant women. This prevalence is higher than the 16.3% reported by Enaruna et al.(11) (2013) in a cohort study, suggesting a potential increase in the occurrence of magnesium deficiency in the studied population. The mean serum magnesium level was 1.29 mEq/L, with a standard deviation of 0.18, indicating a wide range of magnesium levels among participants. This variation underscores the need for routine screening and individualized care plans for pregnant women.

A significant association was found between socioeconomic status and magnesium levels. Among women with hypomagnesemia, 79.2% were from lower socioeconomic backgrounds compared to 65.0% of women with normal magnesium levels. This finding aligns with existing literature that links lower socioeconomic status to poorer nutritional status and limited access to healthcare, both of which can contribute to deficiencies in essential nutrients like magnesium.(19) Socioeconomic disparities in health outcomes highlight the importance of targeted interventions and support for vulnerable populations.(20) The study also identified a significant association between parity and magnesium levels. Grand multiparous women (having had five or more pregnancies) were more likely to have low magnesium levels (5.7%) compared to women with normal magnesium levels (0.5%). This finding is consistent with the hypothesis that repeated pregnancies can deplete maternal nutritional reserves, including magnesium.(21) Adequate maternal nutrition is critical for the health of both the mother and the fetus, particularly in grand multiparous women.

Gestational age was significantly associated with magnesium levels. This significant difference suggests that hypomagnesemia may be more prevalent in women with shorter gestational periods, potentially increasing the risk of preterm labour and associated complications.(22, 23) The study's findings emphasize the importance of monitoring serum magnesium levels as part of prenatal care.(4) Given the higher prevalence of hypomagnesemia in certain demographic groups, healthcare providers should consider targeted screening and interventions. Nutritional counselling and supplementation could be beneficial, particularly for women from lower socioeconomic backgrounds and those with multiple pregnancies.(24, 25)

The present study identified a significant association between low serum magnesium levels and complications during pregnancy and labour. Among women with hypomagnesemia, 96.2% experienced complications during pregnancy compared to 62.4% of women with normal magnesium levels, indicating a statistically significant difference. This finding is consistent with previous studies that have linked magnesium deficiency to various pregnancy-related complications such as preeclampsia, gestational hypertension, and preterm labour.(26) Magnesium plays a crucial role in cellular metabolism and neuromuscular function, and its deficiency can lead to increased uterine irritability and contractions, contributing to these complications.(27) Labour complications were also significantly more prevalent among women with low magnesium levels. The study found that 81.1% of women with hypomagnesemia had complications during labour, compared to 20.3% of women with normal magnesium levels. Magnesium's role as a natural calcium antagonist is critical in muscle relaxation, and its deficiency may result in increased muscle contractility and uterine hyperactivity, leading to labour complications such as dystocia and increased rates of interventions.(2, 28)

The mode of delivery differed significantly between women with low and normal magnesium levels. Only 35.8% of women with hypomagnesemia had vaginal deliveries, compared to 55.8% of women with normal magnesium levels. This statistically significant difference underscores the impact of magnesium levels on the likelihood of requiring a caesarean section (CS).(29) Women with hypomagnesemia may be more prone to complications necessitating surgical intervention, such as fetal distress and failure to progress in labour.(30)

Although the study found significant associations between maternal magnesium levels and pregnancy and labour complications, the differences in neonatal

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(3), 2749-2757 | ISSN:2251-6727

APGAR scores at 1 and 5 minutes were not statistically significant between the two groups. This suggests that while hypomagnesemia is associated with maternal complications, it may not have a direct, immediate impact on neonatal vitality as measured by APGAR scores.(31) However, it is essential to consider that APGAR scores are only a short-term indicator of neonatal health and do not capture long-term outcomes or more subtle neonatal complications.

Conclusion

In conclusion, the present study sheds light on the significant association between serum magnesium levels and pregnancy outcomes among women presenting to a tertiary healthcare facility. The findings reveal a high prevalence of hypomagnesemia, with 21.2% of pregnant women having low magnesium levels. Hypomagnesemia was strongly correlated with an increased risk of complications during both pregnancy and labour, as well as a higher likelihood of requiring a caesarean section. The study underscores the importance of routine screening for serum magnesium levels as part of prenatal care, particularly among women from lower socioeconomic backgrounds and those with multiple pregnancies. Early identification of hypomagnesemia and appropriate management through nutritional supplementation could potentially mitigate the risk of pregnancy and labour complications.

While maternal hypomagnesemia was associated with adverse maternal outcomes, the study did not find a significant impact on short-term neonatal outcomes, as measured by APGAR scores. However, further research is warranted to explore the long-term effects of maternal magnesium deficiency on both maternal and neonatal health. By optimizing maternal nutrition and ensuring access to quality prenatal care, healthcare providers can contribute to improved maternal and neonatal outcomes, ultimately enhancing the health and well-being of both mothers and babies.

References

1. Soma-Pillay P, Nelson-Piercy C, Tolppanen H, Mebazaa A. Physiological changes in pregnancy. Cardiovasc J Afr. 2016;27(2):89-94.
2. Souza ACR, Vasconcelos AR, Dias DD, Komoni G, Name JJ. The Integral Role of Magnesium in Muscle Integrity and Aging: A Comprehensive Review. Nutrients. 2023;15(24).
3. Morton A. Hypomagnesaemia and pregnancy. Obstet Med. 2018;11(2):67-72.
4. Fanni D, Gerosa C, Nurchi VM, Manchia M, Saba L, Coghe F, et al. The Role of Magnesium in Pregnancy and in Fetal Programming of Adult Diseases. Biol Trace Elem Res. 2021;199(10):3647-57.
5. Schlegel RN, Cuffe JSM, Moritz KM, Paravicini TM. Maternal hypomagnesemia causes placental abnormalities and fetal and postnatal mortality. Placenta. 2015;36(7):750-8.
6. Venu L, Padmavathi IJ, Kishore YD, Bhanu NV, Rao KR, Sainath PB, et al. Long-term effects of maternal magnesium restriction on adiposity and insulin resistance in rat pups. Obesity. 2008;16(6):1270-6.
7. Durlach J. New data on the importance of gestational Mg deficiency. Journal of the American College of Nutrition. 2004;23(6):694S-700S.
8. Hantoushzadeh S, Jafarabadi M, Khazardoust S. Serum magnesium levels, muscle cramps, and preterm labor. Int J Gynaecol Obstet. 2007;98(2):153-4.
9. Caddell JL. The apparent impact of gestational magnesium (Mg) deficiency on the sudden infant death syndrome (SIDS). Magnes Res. 2001;14(4):291-303.
10. James MF. Magnesium in obstetrics. Best Pract Res Clin Obstet Gynaecol. 2010;24(3):327-37.
11. Enaruna NO, Ande ABA, Okpere EE. Clinical significance of low serum magnesium in pregnant women attending the University of Benin Teaching Hospital. Nigerian Journal of Clinical Practice. 2013;16(4).
12. World Health Organization. WHO recommendations on antenatal care for a positive pregnancy experience: summary: highlights and key messages from the World Health Organization's 2016 global recommendations for routine antenatal care. World Health Organization; 2018.
13. Nicholls-Dempsey L, Badeghiesh A, Baghlaf H, Dahan MH. How does high socioeconomic status affect maternal and neonatal pregnancy outcomes? A population-based study among

American women. Eur J Obstet Gynecol Reprod Biol X. 2023;20:100248.
14. Montemor MS, Demarque GF, Rodrigues AS, Francisco RPV, de Carvalho MHB. Association between preterm births and socioeconomic development: analysis of national data. BMC Public Health. 2022;22(1):2014.
15. Grobman WA, Bailit JL, Rice MM, Wapner RJ, Reddy UM, Varner MW, et al. Frequency of and factors associated with severe maternal morbidity. Obstet Gynecol. 2014;123(4):804-10.
16. Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. Lancet. 2008;371(9606):75-84.
17. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014. PLoS One. 2016;11(2):e0148343.
18. Kramer MS. The epidemiology of adverse pregnancy outcomes: an overview. J Nutr. 2003;133(5 Suppl 2):1592s-6s.
19. Sharma A, Kharb S, Vineeta, Gulati N. Serum magnesium levels in preterm labour in relation to socioeconomic status. Indian J Clin Biochem. 1998;13(2):123-5.
20. Maher GM, Ward LJ, Hernandez L, Kublickas M, Duvekot JJ, McCarthy FP, et al. Association between socioeconomic status with pregnancy and neonatal outcomes: An international multicenter cohort. Acta Obstetricia et Gynecologica Scandinavica. 2023;102(11):1459-68.
21. Okunade KS, Oluwole AA, Adegbesan-Omilabu MA. A Study on the Association between Low Maternal Serum Magnesium Level and Preterm Labour. Advances in Medicine. 2014;2014:704875.
22. Deeksha HS, Pajai S, Cherukuri S. Study Based on the Alliance Between Serum Magnesium Levels and Preterm Labor: An Inclusive Review. Cureus. 2023;15(7):e42602.
23. Orlova S, Dikke G, Pickering G, Yaltseva N, Konchits S, Starostin K, et al. Risk factors and comorbidities associated with magnesium deficiency in pregnant women and women with hormone-related conditions: analysis of a large real-world dataset. BMC Pregnancy and Childbirth. 2021;21(1):76.
24. Marshall NE, Abrams B, Barbour LA, Catalano P, Christian P, Friedman JE, et al. The importance of nutrition in pregnancy and lactation: lifelong consequences. Am J Obstet Gynecol. 2022;226(5):607-32.
25. Dewidar O, John J, Baqar A, Madani MT, Saad A, Riddle A, et al. Effectiveness of nutrition counseling for pregnant women in low- and middle-income countries to improve maternal and infant behavioral, nutritional, and health outcomes: A systematic review. Campbell Syst Rev. 2023;19(4):e1361.
26. Dalton LM, Ní Fhloinn DM, Gaydadzhieva GT, Mazurkiewicz OM, Leeson H, Wright CP. Magnesium in pregnancy. Nutrition reviews. 2016;74(9):549-57.
27. Nurwany R, Wulandari NAA, Sinulingga S. Role of magnesium in pregnancy. INSPIRE.436.
28. Parente E, Colannino G, Ferrara P. Efficacy of magnesium and alpha lipoic acid supplementation in reducing premature uterine contractions. Open Journal of Obstetrics and Gynecology. 2014;2014.
29. Magpie Trial Collaborative Group. Do women with pre-eclampsia, and their babies, benefit from magnesium sulphate? The Magpie Trial: a randomised placebo-controlled trial. The Lancet. 2002;359(9321):1877-90.
30. Overton E, Tobes D, Lee A. Preeclampsia diagnosis and management. Best practice & research Clinical anaesthesiology. 2022;36(1):107-21.
31. Das M, Chaudhuri PR, Mondal BC, Mitra S, Bandyopadhyay D, Pramanik S. Assessment of serum magnesium levels and its outcome in neonates of eclamptic mothers treated with low-dose magnesium sulfate regimen. Indian journal of pharmacology. 2015;47(5):502-8.

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(3), 2749-2757 | ISSN:2251-6727

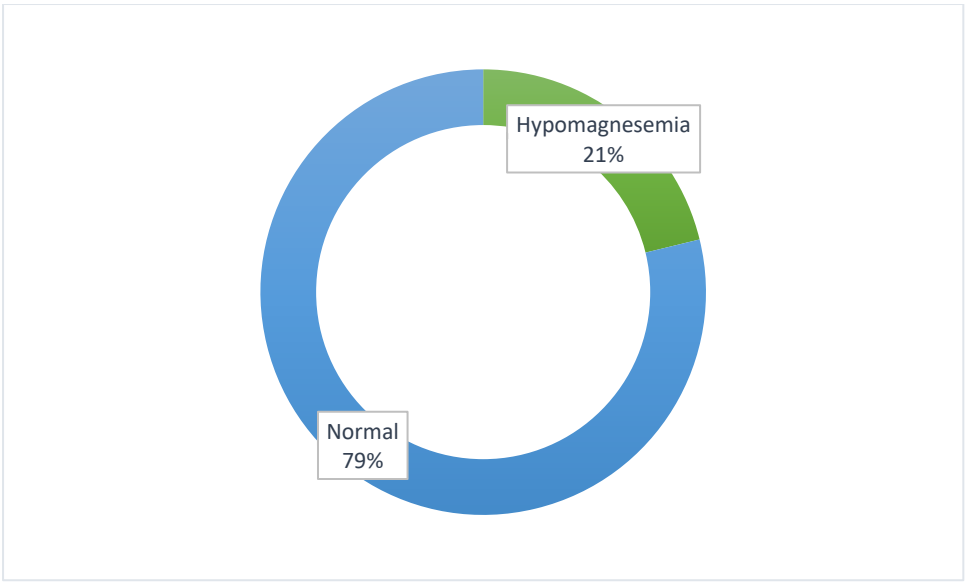

Figure 1: Prevalence of hypomagnesemia

Table 1: Association between sociodemographic characteristics, obstetric history, and levels of magnesium

		Levels of magnesium		Total	p value
		Low N = 53 n (%)	**Normal N = 197 n (%)**	**N = 250 n (%)**	
Age (in years)	18 to 25	29 (54.7)	104 (52.8)	133 (53.2)	0.367
	26 to 30	14 (26.4)	68 (34.5)	82 (32.8)	
	More than 30	10 (18.9)	25 (12.7)	35 (14.0)	
Socioeconomic status	Lower	42 (79.2)	128 (65.0)	170 (68.0)	0.048*
	Middle or upper	11 (20.8)	69 (35.0)	80 (32.0)	
Parity	Primi	23 (43.4)	97 (49.2)	120 (48.0)	0.027*
	Multi (2-4)	27 (50.9)	99 (50.3)	126 (50.4)	
	Grand multi (≥5)	3 (5.7)	1 (0.5)	4 (1.6)	
Gestational age (in weeks)	Up to 32	3 (5.7)	3 (1.5)	6 (2.4)	0.001*
	32 to 36 completed	23 (43.4)	37 (18.8)	60 (24.0)	
	37 to 42	27 (50.9)	157 (79.7)	184 (73.6)	
*Statistically significant at p<0.05					

Table 2: Association between blood pressure, haemoglobin, OGCT, and levels of magnesium

	Levels of magnesium		p value
	Low N = 53 Mean (SD)	**Normal N = 197 Mean (SD)**	
Systolic blood pressure	118.3 (15.9)	114.4 (13.6)	0.075

Journal of Chemical Health Risks

www.jchr.org

JCHR (2025) 15(3), 2749-2757 | ISSN:2251-6727

Diastolic blood pressure	79.6 (9.3)	77.3 (10.2)	0.371
Haemoglobin	10.5 (2.1)	10.7 (2.4)	0.062
OGCT	100.6 (23.4)	103. 2 (18.5)	0.393
*Statistically significant at p<0.05 OGCT, oral glucose challenge test			

Table 3: Association between maternal, neonatal outcomes and levels of magnesium

		Levels of magnesium		**Total**	**p value**
		Low N = 53 n (%) or Mean (SD)	**Normal N = 197 n (%) or Mean (SD)**	**N = 250 n (%) or Mean (SD)**	
Maternal complications during pregnancy	Present	51 (96.2)	123 (62.4)	174 (69.6)	0.001*
	Absent	2 (3.8)	74 (37.6)	76 (30.4)	
Maternal complications in labour	Present	43 (81.1)	40 (20.3)	83 (33.2)	0.001*
	Absent	10 (18.9)	157 (79.7)	167 (66.8)	
Mode of delivery	Vaginal	19 (35.8)	110 (55.8)	129 (51.6)	0.010*
	LSCS	34 (64.2)	87 (44.2)	121 (48.4)	
Birth weight (in kg)		2.4 (0.6)	2.8 (0.4)	2.6 (0.5)	0.001*
APGAR at 1 minute		7.2 (0.8)	7.5 (0.6)	7.4 (0.7)	0.162
Apgar at 5 minutes		8.7 (0.6)	8.8 (0.6)	8.8 (0.6)	0.367
*Statistically significant at p<0.05					