

PREVALENCE OF HYPOMAGNESEMIA IN WOMEN UNDERGOING PRETERM LABOR

Javaria Majeed¹, Safia Majeed², Lubna Noor³, Rimsha Irshad⁴, Hafiza Maryam Mushtaq⁵,
Nadia Naheed⁶, Khadija Majeed⁷, Muhammad Asad Ullah⁸

¹PGR, Gynae & Obs, CMH Multan, Pakistan

²FCPS (Gynae & Obs), DHQ Hospital, Vehari, Pakistan

³Assistant Professor, CMH Multan, Pakistan

⁴PGR (FCPS), Gynae & Obs, CMH Multan, Pakistan

⁵Allama Iqbal Teaching Hospital, DHQ Dera Ghazi Khan, Pakistan

⁶PGR (FCPS), Gynae & Obs, CMH Multan, Pakistan

⁷DHQ Hospital, Dera Ghazi Khan, Pakistan

⁸Ibn-e-Siena Hospital, Multan, Pakistan

¹javariamajeed20142019@gmail.com, ²drnaumanch@gmail.com, ³lubnanoor2002@hotmail.com,

⁴drrimshairshad@gmail.com, ⁵maryammushtaq73@gmail.com, ⁶dr.nadianaheed@gmail.com,

⁷khadija_majeed@hotmail.com, ⁸zaidddd321@gmail.com

DOI: <https://doi.org/10.5281/zenodo.20844356>

Keywords

Hypomagnesemia, Magnesium, Preterm labor, preterm premature rupture of membranes (PPROM)

Article History

Received: 04 April 2025

Accepted: 11 April 2025

Published: 27 April 2025

Copyright @Author

Corresponding Author: *

Dr. Javaria Majeed

Abstract

Objective: To observe the prevalence of hypomagnesemia in women presenting with preterm labor to a tertiary care hospital

Study Design: Descriptive, Cross-sectional Study

Place and Duration of Study: Department of Obstetrics & Gynecology, Combined Military Hospital Multan, Pakistan from Oct 2024 to Mar 2025

Methodology: Pregnant females age 20-45 years, singleton gestation, intact fetal membranes, and preterm onset of labor, undergoing SVD, elective or emergency C-section were included. The baseline data including age (years), gestational age (weeks), parity and serum magnesium levels were noted. The data were stratified on age groups, parity, BMI and gestational age to determine the effect on frequency of hypomagnesaemia.

Results: Total Two hundred and sixty five women presenting with preterm labor were enrolled with median age of 30.00(11.00) years, median gestational age of 32.00(5.00) weeks and median serum magnesium levels were 1.80 (0.80) mg/dL. Overall, hypomagnesemia was observed in 79 women, giving an overall prevalence of 29.8%. On stratification by age groups, the frequency of hypomagnesemia was 19 (7.1%) in <25 years, 52 (19.6%) in 25–40 years, and 8 (3.0%) in aged >40 years. When stratified by gestational age groups, hypomagnesemia was present in 35 (13.2%) women with moderate preterm labor, 18 (6.8%) with very preterm labor, and 26 (9.8%) with late preterm labor (p=0.06).

Conclusion: This study concluded that one-third females presenting with preterm labor had statistically significant low magnesium levels, highlighting potential role in pregnancy outcome.

INTRODUCTION

Preterm birth is defined as delivery of the baby before 37 completed weeks of pregnancy to the limit of viability as early as 24 weeks.⁽¹⁾ Births before 32 weeks of gestation (2% of all births) account for most neonatal deaths and disorders.⁽²⁾ Approximately 15 million babies are born preterm annually worldwide, indicating a global preterm birth rate of about 11%.⁽³⁾ In Pakistan, prevalence of preterm birth is reaching up-to 18.8% contributing to morbidity and mortality among newborns.⁽⁴⁾ About a third of neonatal deaths are directly attributed to prematurity and this has hindered the achievement of Millennium Development Goal-4 target. The World Health Organization estimates the prevalence of preterm birth to be 5–18% globally.⁽⁵⁾

Approximately 45-50% of preterm births are idiopathic due to spontaneous preterm labor (PTL), 30% are related to placenta-previa and preterm premature rupture of membranes (PPROM) and another 15-20% is attributed to pre-eclampsia or eclampsia, maternal thyroid disease, asthma, fetal distress or elective preterm deliveries.⁽⁶⁾ However, having varied etiology, PTL may be due to urinary tract infection, bacterial vaginosis and changes in various biochemical functions at cellular level causing hypomagnesemia, hypokalemia, hypo- and hypernatremia.⁽⁷⁾ Preterm labor leads to maternal as well as neonatal complications like premature rupture of membrane, neonatal jaundice, respiratory distress and sepsis.⁽⁸⁾ Hypomagnesaemia (Serum magnesium level <1.6 mg/dl) in pregnancy causes complications like pre-eclampsia, eclampsia, premature rupture of membrane, leading to preterm labor, neonatal complications like ARDS and sepsis.⁽⁹⁾

Due to the paucity of data in this regard in Pakistan, the study has been planned to investigate the magnitude of hypomagnesemia in pregnant women undergoing preterm labor. This will help in making a generic framework to combine this screening information with designing a prophylactic intervention. This will also help in reducing morbidity and mortality

resulting from prematurity associated with hypomagnesaemia.

METHODOLOGY

It was a Cross-Sectional Study, done in the Department of Obstetrics & Gynecology, Combined Military Hospital Multan, Pakistan from Oct 2024 to Mar 2025 over period of 6 months following approval of the Institutional Ethical committee (ERC No. 110/2024 dated 26-09-2024). The sample size was calculated using the WHO sample size calculator taking a confidence interval of 95%, a margin of error of 5%, and a reported prevalence of hypomagnesaemia of 21.2% in pregnancy.⁽¹⁰⁾ The estimated sample size came out to be 257 patients. A consecutive non-probability sampling technique was used.

Inclusion Criteria: All pregnant female patients of age 18-40 years, singleton gestation (confirmed on USG abdomen), intact fetal membranes (clinical examination), and preterm onset of labor, undergoing SVD, elective or emergency C-section and given consent were included in the study.

Exclusion Criteria: Patients with urinary tract infection, preeclampsia, twin pregnancy, Chronic Kidney Disease, Thyroid disease, and those who didn't give consent were excluded.

A total of 265 women presenting to the OBG department with preterm labor and fulfilling the inclusion criteria were enrolled after informed consent. The baseline data including age (years), gestational age (weeks), parity and BMI were noted. Three ml of venous blood samples was collected from antecubital vein in a dry vial with disposable syringe and needle. Measurement of serum magnesium levels was done from a single laboratory for presence of hypomagnesaemia. Serum magnesium level <1.6 mg/dl was taken as hypomagnesaemia.⁽¹¹⁾

The obtained data was entered and analyzed using Statistical Package for Social Sciences (SPSS v25.0). Normality of data was assessed through Shapiro-Wilk test. Continuous variables like age, gestational age, BMI and magnesium levels were

presented as mean $\pm$ standard deviation or median [IQR] whereas categorical variables like parity and hypomagnesaemia were presented as frequency and percentages. The data were stratified on age groups, parity, BMI and gestational age to determine the effect on frequency of hypomagnesaemia. Post-stratification chi-square test was applied and p-value ≤ 0.05 was taken as statistically significant.

RESULTS

Total Two hundred and sixty five women presenting with preterm labor during study

duration were enrolled in the study with median age of 30.00(11.00) years and median gestational age at presentation was 32.00 (5.00) weeks. Moreover, the median BMI was noted to be 24.50(2.60) kg/m² and the median serum magnesium levels were 1.80(0.80) mg/dL in study participants. With respect to parity, 59(22.3%) participants were primiparous and 206(77.7%) were multiparous. Overall, hypomagnesaemia (serum magnesium < 1.5 mg/dL) was observed in 79 women, giving an overall prevalence of 29.8%.

Table I: Baseline characteristics of women presenting with preterm labor (n=265)

Variable		Total (n = 265)
Age (years), median [IQR]		30.00(11.00)
Gestational age (weeks), median [IQR]		32.00(5.00)
BMI (kg/m ²), median [IQR]		24.50(2.60)
Serum magnesium (mg/dL), median [IQR]		1.80(0.80)
Parity, n(%)	Multiparous	206(77.7%)
	Primiparous	59(22.3%)
Hypomagnesaemia (Mg < 1.5 mg/dL), n(%)		79(29.8%)

On stratification by age groups, the frequency of hypomagnesaemia was 19(7.1%) in women aged < 25 years, 52(19.6%) in women aged 25–40 years, and 8(3.0%) in women aged > 40 years. The association between age group and hypomagnesaemia was not statistically significant ($p=0.609$). When stratified by gestational age groups, hypomagnesaemia was present in 35(13.2%) women with moderate preterm labor,

18(6.8%) with very preterm labor, and 26 (9.8%) with late preterm labor ($p=0.06$).

Across BMI categories, hypomagnesaemia was detected in 53(20.0%) women with BMI < 25 kg/m² and 26(9.8%) women with BMI > 25 kg/m² ($p=0.333$). With respect to parity, hypomagnesaemia was found in 21(7.9%) primiparous, 56(21.1%) multiparous, and 2(0.75%) grand multiparous women ($p = 0.524$).

Table II: Prevalence of hypomagnesaemia overall and stratified by baseline characteristics (n=265)

Stratification variable	Category	Total in category n (%)	Hypomagnesaemia n (%)	p-value
Age group (years)	< 25 years	67(25.3%)	19(7.1%)	0.609
	25 – 40 years	164(61.9%)	52(19.6%)	
	> 40 years	34(12.8%)	8(3%)	
Gestational age (weeks)	Moderate Preterm	91(34.3%)	35(13.2%)	0.06
	Very Preterm	81(30.6%)	18(6.8%)	
	Late Preterm	93(35.1%)	26(9.8%)	
BMI (kg/m ²)	< 25	165(62.3%)	53(20%)	0.333
	> 25	100(37.7%)	26(9.8%)	
Parity	Primiparous	59(22.3%)	21(7.9%)	0.524

	Multiparous	200(75.5%)	56(21.1%)	
	Grand Multiparous	6(2.3%)	2(0.75%)	

As all stratified associations were statistically non-significant, multivariable regression analysis was not performed.

DISCUSSION

The findings of this study indicated that hypomagnesemia was a frequent coexisting abnormality in women presenting with preterm labor, with nearly one-third of participants affected (29.8%). In findings of a study by Kaisery et al, it was concluded that women with preterm labor had 21.2% prevalence of hypomagnesemia.⁽¹⁰⁾ This suggested that hypomagnesemia needs to be under consideration during evaluation, especially in resource-limited environments where only simple biochemical markers are available for clinical decision making. In a study by Ashraf S et al, 219 patients with preterm labor were included with age 20-40 years having 37.9% incidence of hypomagnesemia in studied patients.⁽¹²⁾ In another study by Okunade et al, 200 patients [100 females with term pregnancy (controls), and 100 females undergoing preterm labor (cases)] were studied. It was observed that 47.3% of the case patients (preterm labor) had serum magnesium level less than 1.6 mg/dL, whereas only 25% of the control patients had hypomagnesemia.⁽¹³⁾

In this study, the mean serum magnesium levels were found to be 1.68 ± 0.25 mg/dL. Khan et al also concluded in a study that women with preterm labor had mean magnesium levels of 1.62 ± 0.14 mg/dL with 48.2% incidence of hypomagnesemia in preterm labor.⁽¹⁴⁾ Meena et al also found significantly low serum magnesium levels in women with preterm labor having mean magnesium levels of 1.46 ± 0.077 mg/dL.⁽¹⁵⁾

Statistically significant differences across age group, gestational age category, BMI, and parity were absent implying that hypomagnesemia is not specific to any maternal subgroup. Post-stratification by age group, it was observed that hypomagnesemia was observed in 19 (7.1%) of women aged 18-25 years, 19.6% women aged 25-

40 years, and 8 (3.0%) in women >40 years of age ($p=0.609$). Preterm pregnant females had significantly depressed serum magnesium levels with mean 1.70 ± 0.33 mg/dL with statistically significant low magnesium levels in women > 35 years age ($p=0.027$).⁽¹⁶⁾

A study by Akram et al concluded that female presenting with preterm labor, 37.9% had hypomagnesemia with age group 31-40 years had highest frequency of hypomagnesemia among studied participants ($p=0.337$). Also, stratification as per parity, multiparous patients found to have higher incidence of low magnesium levels as compared to primiparous ($p=0.841$).⁽¹⁷⁾ Similarly, Ashraf et al showed 37.1% frequency of hypomagnesemia with post-stratification as per age group, 31-40 years age had 41.1% and 21-30 years had 34.8% prevalence of hypomagnesemia.⁽¹⁸⁾

Stratification by gestational age showed hypomagnesemia in 13.2% women with moderate preterm labor, 18 (6.8%) women with very preterm labor, and 26 (9.8%) women with late preterm labor ($p=0.06$). The near-significant association with gestational age categories ($p = 0.06$) suggested a possible trend, but the available data were insufficient to support a firm conclusion.

Astha et al showed that mean serum magnesium levels were 1.79 ± 0.22 mg/dL in females with preterm labor and it had 64.8% sensitivity and 66.1% specificity for predicting preterm labor at cut-off serum magnesium of < 1.88 mg/dL.⁽¹⁹⁾ Similarly, Mustafa et al reported that 56.1% preterm pregnant women had low serum magnesium levels (<1.80 mg/dL) which had 2.33 times higher risk of preterm labor as compared to normal serum magnesium levels.⁽²⁰⁾

Magnesium has pivotal role in neuromuscular stability and uterine contractility during labor, therefore, deficiency directly affects preterm labor and overall outcome. Overall, the results suggested that hypomagnesemia is common among preterm labor patients, and given magnesium significant for labor progression,

replacement during last trimester in significant in improving labor outcome.

LIMITATIONS

The authors are well aware of limitations of this study foremost being a single-center study with limited sample size. The cross-sectional design prevented any inference about temporality or causation between hypomagnesemia and preterm labor. Serum magnesium was measured at a single time point, which might not have reflected longer-term magnesium status. The study also did not assess potentially important confounders such as dietary magnesium intake, supplement use, socioeconomic status, and other micronutrient deficiencies. In addition, some subgroups (e.g., grand multiparous and >40 years) were small, which may have reduced statistical power for stratified comparisons. These factors may partly have explained the non-significant associations observed. Future research including RCTs with multicenter cohorts to be conducted for more accurate results before implementing results on national scale.

CONCLUSION

This study concluded that one-third females presenting with preterm labor had statistically significant low magnesium levels, highlighting potential role in pregnancy outcome. Moreover, post-stratification as per age, BMI, parity and gestational age revealed varying frequency but statistically insignificant value. As magnesium have pivotal value for neuromuscular and uterine function especially during labor, routine monitoring and replacement of magnesium is beneficial for better labor outcome.

CONFLICT OF INTEREST None

FUNDING Nil

AUTHOR'S CONTRIBUTION

The authors confirm the contribution to the paper as follows:

Conception and study design, data acquisition, manuscript writing, analysis and interpretation, final approval

Conception and study design, analysis and interpretation, critical review and final approval
Conception and data acquisition, manuscript writing, critical review and final approval
Concept and study design, analysis and interpretation, critical review and final approval

ACKNOWLEDGEMENT

We extend our gratitude to all colleagues for assistance in data collection and analysis. We are thankful to all patients and their attendants for consent for participation in the study.

REFERENCES

- Dagklis T, Akolekar R, Villalain C, Tsakiridis I, Kesrouani A, Tekay A, et al. Management of preterm labor: Clinical practice guideline and recommendation by the WAPM-World Association of Perinatal Medicine and the PMF-Perinatal Medicine Foundation. *Eur J Obstet Gynecol Reprod Biol.* 2023;291:196-205. <https://doi.org/10.1016/j.ejogrb.2023.10.013>
- Lee SK, Beltempo M, McMillan DD, Seshia M, Singhal N, Dow K, et al. Outcomes and care practices for preterm infants born at less than 33 weeks' gestation: a quality-improvement study. *Can Med Assoc J.* 2020;192(4):E81-91. <https://doi.org/10.1503/cmaj.190940>
- Walani SR. Global burden of preterm birth. *Int J Gynecol Obstet.* 2020;150(1):31-33. <https://doi.org/10.1002/ijgo.13195>
- Hanif A, Ashraf T, Waheed K, Sajid MR, Guler N, Pervaiz MK. Prevalence of Preterm Birth in Pakistan: A Systematic Review and Meta-Analysis. *Ann King Edw Med Univ.* 2017;23(2):229-235. <https://doi.org/10.21649/akemu.v23i2.1615>
- Wagura P, Wasunna A, Laving A, Wamalwa D, Ng'ang'a P. Prevalence and factors associated with preterm birth at kenyatta national hospital. *BMC Pregnancy Childbirth.* 2018;18(1):107-115. <https://doi.org/10.1186/s12884-018-1740-2>

- Crump C, Sundquist J, Sundquist K. Preterm delivery and long term mortality in women: national cohort and co-sibling study. *BMJ*. 2020;2533. <https://doi.org/10.1136/bmj.m2533>
- MangalaGeethaDrA. Association of hypomagnesemia in pre-eclampsia and preterm labor. *Int J ClinObstetGynaecol*. 2020;4(2):16–18. <https://doi.org/10.33545/gynae.2020.v4.i2a.497>
- Mohsan Nadeem Sheikh, Ayesha Rafiq, Saira Khalid, Yasir Salim, Arshad Rafique, M. SohailShahzad, et al. Preterm births and their associated clinical outcomes in a Tertiary Care Hospital in Lahore. *Prof Med J*. 2025;32(02):221–227. <https://doi.org/10.29309/TPMJ/2025.32.02.8787>
- Lanehart D, Uzoma C, Zaman MS, Akimbekov NS, Lopez-Alvarenga JC, Razzaque MS. Maternal and Fetal Magnesium Balance: Impacts and Implications. Cham: Springer Nature Switzerland; 2026. p. 133–139. https://doi.org/10.1007/978-3-032-04357-3_11
- Kaisery SS, Chunchaiah S, Sailakshmi M. Clinical Significance of Low Serum Magnesium in Pregnant Women –A Hospital based Descriptive Analytical Cross-Sectional Study. *Vol. 15*. 2025;15(3):2749–2757.
- Fiorentini D, Cappadone C, Farruggia G, Prata C. Magnesium: Biochemistry, Nutrition, Detection, and Social Impact of Diseases Linked to Its Deficiency. *Nutrients*. 2021;13(4):1136–1179. <https://doi.org/10.3390/nu13041136>
- Mahboobunnisa S, Anaparthi SJ, Anujna T, Chowdary A. A study on role of Serum Magnesium Levels in Preterm Labour. 2024;16(12):87-89.
- Okunade KS, Oluwole AA, Adegbesan-Omilabu MA. A Study on the Association between Low Maternal Serum Magnesium Level and Preterm Labour. *Adv Med*. 2014:1–6. <https://doi.org/10.1155/2014/704875>
- Khan A, Muzaffar G, Muzaffar S. Association of hypomagnesemia with preterm labour – a case control study. *J Med Health Sci Rev*. 2025;2(3). <https://doi.org/10.62019/74qqgt44>
- Meena PK, Maheshwari S. Serum magnesium level as a predictive tool for preterm labour. *Indian J ObstetGynecol Res*. 2020;7(3):356–363. <https://doi.org/10.18231/j.ijogr.2020.07.7>
- Ogoke NC, Njoku AN, Ogoke OJ, Okorochukwu BC. Serum Magnesium among Women with Preterm Labour in a Tertiary Health Institution in South-East Nigeria: A Comparative Study. *Open J Obstet Gynecol*. 2025;15(06):963–971. <https://doi.org/10.4236/ojog.2025.156078>
- Akram DA. Frequency Of Hypomagnesaemia In Pre Term Labour. *J Med, Physio and Biophysic*. 2018;42:41-45. ISSN 2422-8427
- Ashraf S, Parveen S, Alam S. Preterm Labour: Frequency Of Hypomagnesaemia In Preterm Labour. *Prof Med J*. 2018;25(9):1342–1345. <https://doi.org/10.29309/TPMJ/2018.25.09.104>
- Astha, Divya. Serum magnesium level at 24 to less than 37 weeks: a prospective COHORT study predicting spontaneous preterm delivery. *Int J ReprodContraceptObstet Gynecol*. 2023;12(11):3347–52. <https://doi.org/10.18203/2320-1770.ijrcog20233307>
- Mustafa RHJ, Mahmood MB, MBChB, FICOG; Assistant Professor in Obstetrics and Gynecology Department at Medical College-Sulaymaniyah University-Kurdistan Region/Iraq. The Association Between Low Maternal Serum Magnesium Levels and Preterm Labor. *Adv Med J*. 2025;10(3):55–60. <https://doi.org/10.56056/amj.2025.368>