



Prenatal Anemia and Risk of Postpartum Hemorrhage Following Normal Vaginal Delivery of Patients Presenting to Mufti Mehmood Memorial Teaching Hospital, Gomal Medical College, D.I. Khan

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Authors' Contribution

Both authors equally contributed to the study and approved the final manuscript

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ABSTRACT

Background: Prenatal anemia is very common in pregnant women because many women start pregnancy with low iron in the body and poor diet. When the level of hemoglobin becomes low, the mother cannot carry good oxygen, and this makes her weak, tired, and more at risk during childbirth. Women who have anemia before giving birth cannot handle blood loss well, so the danger of postpartum hemorrhage becomes very high. **Objective:** To determine the frequency of postpartum hemorrhage in pregnant women presenting with prenatal anemia following normal vaginal delivery. **Study Design:** Cross sectional research study. **Duration and Place of Study:** This study was done from October 2024 to April 2025 in the Department of Obstetrics and Gynaecology, Gomal Medical College, Dera Ismail Khan. **Methodology:** A total of 146 pregnant women aged 15 to 45 years with prenatal anemia and normal vaginal delivery were included. Hemoglobin values were checked, and blood loss after delivery was recorded. Postpartum hemorrhage was defined as blood loss equal to or more than 500 milliliters in the first twenty-four hours after delivery. Chi-square test and Fisher exact test were used for finding association, and a p-value less than or equal to 0.05 was taken as significant. **Results:**

The mean age was 31.62 years, and the mean hemoglobin was 9.14 grams per deciliter. Postpartum hemorrhage happened in 32 women (21.90%), while 114 women (78.10%) did not have postpartum hemorrhage. Women aged thirty years or less had postpartum hemorrhage in 28.4% cases, and women above thirty years had 16.5% cases ($p = 0.083$). Rural women showed more postpartum hemorrhage (26.1%) than urban women (15.5%) ($p = 0.129$). Socioeconomic groups also showed differences, but these were not significant ($p = 0.134$). **Conclusion:** This study shows that postpartum hemorrhage was high in women who had prenatal anemia.

INTRODUCTION

Anemia in pregnancy become a very common problem because many women enter pregnancy with low iron stores and poor nutrition, and the need of iron increase a lot during this period.¹ When the hemoglobin drop, the body cannot carry enough oxygen to the mother tissues and also to the fetus growth, so the woman feel tired, dizzy and weak most of the time.² In many places, the screening for anemia is done but still many pregnant women do not receive early treatment or proper iron supplements, so the condition get worse as pregnancy progress, especially in third trimester when demand of iron is highest.³ Anemia also reduce the ability of the mother to tolerate blood loss and make other complications more risky.⁴

Postpartum hemorrhage is one of the dangerous complication after delivery and it happen when the mother lose too much blood within short time, usually more than 500 ml after normal delivery or more than 1000 ml after

cesarean.⁵ Most reason for postpartum hemorrhage include uterine atony, where the uterus cannot contract properly, trauma during delivery, retained placenta, or problems with blood clotting.⁶ When the bleeding continue uncontrolled, the mother heart work harder to maintain circulation but quickly fail, leading to shock and sometimes death if not managed fast.⁷ Early detection and active management of the third stage of labor are very important to prevent severe bleeding, but many cases still happen specially in low-resource settings where emergency care is limited.⁸

Postpartum hemorrhage in women who already have prenatal anemia become more severe because they start labor with very low hemoglobin and weak capacity to handle any blood loss.⁹ Even small bleeding can make them unstable, and moderate bleeding can cause rapid fall in oxygen delivery to vital organs, so these mothers collapse sooner than healthy women.¹⁰ Prenatal anemia

also reduces the response of the uterus to contract normally, increasing the chance of uterine atony, which is the main reason of postpartum hemorrhage.¹¹ In many cases, the combination of anemia and heavy bleeding lead to faster shock, need for blood transfusion, and higher maternal mortality.¹² Therefore, controlling anemia during pregnancy is very important step to reduce the danger of postpartum hemorrhage and to improve the survival of both mother and baby

There was need to do this study in Dera Ismail Khan because many pregnant women there still came late to hospital with low hemoglobin and poor antenatal checkup. In this area, nutrition issues, low awareness, and limited health facilities made anemia very common, so the risk of postpartum hemorrhage became more high. Many deliveries also happened in basic centers or at home where emergency care was not strong, so mothers with anemia suffered more bleeding complications. By studying this problem in Dera Ismail Khan, we understood the real situation and planned better ways for prevention and early treatment to save mothers life.

METHODOLOGY

This cross sectional research was carried out in the Department of Obstetrics and Gynaecology at Gomal Medical College, Dera Ismail Khan, and it took place from 10 October 2024 till 10 April 2025. Permission for running the study was taken from the institutional ethics authority (No. 95/GIMS/JC - Dated: July 5, 2024), and no participant was included before the approval letter was granted. The sample size came out as 146 after using a 95% confidence level and 8% error margin, with an expected frequency of prenatal anemia 41.8%.¹³

Women were chosen with age between 15 and 45 years, and if they had a normal vaginal delivery of a single fetus with prenatal anemia. Prenatal anemia meant that the hemoglobin level stayed <11 g/dL in the first and third trimester, and <10.5 g/dL in second trimester. Women were not taken if they had cesarean section, multiple pregnancy, missing hemoglobin records, known bleeding disorders, placental problems, congenital fetal issues, previous uterine surgeries, pregnancy-related complications such as preeclampsia or gestational hypertension, or if they received any blood transfusion before or during labor. Before starting the data collection, every eligible woman was explained about the study aim, the process, and that their personal details would stay private.

Demographic features were recorded. Previous medical and obstetric issues were also asked. Hemoglobin value in the third trimester at presentation for delivery was entered. During labor, the information about estimated blood loss, use of oxytocin, manual removal of placenta, and other events were written on a predesigned paper form. After delivery, the presence of postpartum hemorrhage was assessed according to the defined criteria. Postpartum hemorrhage meant measured or assessed blood loss ≥ 500 mL in the first 24 hours after normal vaginal delivery.

All collected values were entered into software SPSS 25. Numerical variables like age, height, weight, BMI, gestational age, hemoglobin value, and estimated blood

loss were shown as mean with standard deviation or median with IQR depending on the normality. Categorical variables were displayed as percentages. Stratification of postpartum hemorrhage was done with age, gestational age, education, and residence. Chi-square or Fisher exact test was applied after stratification, and p-value ≤ 0.05 was taken as significant.

RESULTS

The mean age of the subjects was 31.62 ± 7.35 years, while mean BMI was 22.76 ± 2.78 kg/m². The mean gestational age at the time of delivery was 37.14 ± 1.89 weeks, and mean parity was 2.68 ± 1.71 . Also, the baseline hemoglobin level was documented at 9.14 ± 1.09 g/dL; obviously, all patients suffered from anemia. The mean estimated blood loss was 421.97 ± 267.52 mL. In terms of geographical distribution per residency, most pregnant females resided in rural settings (88, 60.3%) in comparison with females in the urban settings (58, 39.7%). The majority of the pregnant population was found to have low socioeconomic status (91, 62.3%), whereas 45 (30.8%) females had mid-level and 10 (6.8%) females as shown in Table-I

Table I
Patient Demographics

Demographics	Mean \pm SD
Age (years)	31.62 \pm 7.35
BMI (kg/m ²)	22.76 \pm 2.78
Gestational Age (weeks)	37.14 \pm 1.89
Parity	2.68 \pm 1.71
Hemoglobin (g/dL)	9.14 \pm 1.09
Estimated Blood Loss (mL)	421.97 \pm 267.52
Residency	
Urban n (%)	58 (39.7%)
Rural n (%)	88 (60.3%)
Socioeconomic Status	
Low n (%)	91 (62.3%)
Middle n (%)	45 (30.8%)
High n (%)	10 (6.8%)

The primary outcome of postpartum hemorrhage was observed in 32 women (21.90%), while 114 women (78.10%) did not experienced postpartum hemorrhage following normal vaginal delivery as shown in Table-II.

Table II
Frequency of Postpartum Hemorrhage in Pregnant Women Presenting with Prenatal Anemia Following Normal Vaginal Delivery

Postpartum Hemorrhage	Frequency	%age
Yes	32	21.90%
No	114	78.10%
Total	146	100%

Women aged ≤ 30 years showed higher frequency of postpartum hemorrhage (19, 28.4%) compared to those aged >30 years (13, 16.5%), however this difference was not statistically significant ($p=0.083$). Rural residents demonstrated higher occurrence of postpartum hemorrhage (23, 26.1%) than urban residents (9, 15.5%), but this association also failed to reach statistical significance ($p=0.129$). Regarding socioeconomic status, low socioeconomic group had 19 cases (20.9%), middle group had 13 cases (28.9%), and high socioeconomic group had no cases of postpartum hemorrhage, though the association was not significant ($p=0.134$, Fischer Exact Test). Gestational age showed minimal variation, with

women having ≤ 36 weeks showing 12 cases (21.1%) and those with > 36 weeks showing 20 cases (22.5%) of postpartum hemorrhage, with no significant difference ($p=0.840$). Similarly, parity did not demonstrated significant association, as women with parity ≤ 3 had 18 cases (20.0%) while those with parity > 3 had 14 cases (25.0%) of postpartum hemorrhage ($p=0.478$) as shown in Table-III.

Table III

Association of Postpartum Hemorrhage with Demographic Factors

Demographic Factors		Postpartum Hemorrhage		p-value
		Yes n(%)	No n(%)	
Age (years)	≤ 30	19 (28.4%)	48 (71.6%)	0.083
	> 30	13 (16.5%)	66 (83.5%)	
Residency	Urban	9 (15.5%)	49 (84.5%)	0.129
	Rural	23 (26.1%)	65 (73.9%)	
Socioeconomic Status	Low	19 (20.9%)	72 (79.1%)	0.134*
	Middle	13 (28.9%)	32 (71.1%)	
	High	0 (0.0%)	10 (100.0%)	
Gestational Age (weeks)	≤ 36	12 (21.1%)	45 (78.9%)	0.840
	> 36	20 (22.5%)	69 (77.5%)	
Parity	≤ 3	18 (20.0%)	72 (80.0%)	0.478
	> 3	14 (25.0%)	42 (75.0%)	

*Fischer Exact Test

DISCUSSION

The result shows that postpartum hemorrhage was experienced in 32 out of 146 women (21.90%), which shows that there was a significant proportion of anemic mothers who developed postpartum hemorrhage. The high incidence can be related to the fact that mothers with anemia already have low hemoglobin reserves; thus, anything beyond the physiological blood loss can lead to potentially disastrous postpartum hemorrhage due to diminished hemoglobin reserves. The mean hemoglobin was at 9.14 ± 1.09 g/dL; therefore, all mothers included in the record were anemic. The low hemoglobin level in mothers who already had anemia was important because they would have little hemoglobin reserves against the blood loss experienced in giving birth, hence having the potential of low blood loss leading to postpartum hemorrhages. An estimate of blood loss was at 421.97 ± 267.52 mL, close to the criteria defining postpartum hemorrhages. Anemic mothers tend to lose greater amounts of blood because they have diminished uterine muscle contraction power due to inadequate blood supply due to low hemoglobin level in uterine muscle cells.

Under 30 years, there was a significant increased occurrence of postpartum hemorrhage (28.4%) than in the elder ones (16.5%), although not significant ($p=0.083$). The explanation to this phenomenon could be due to lower uterine contractibility in the under 30 age bracket and antenatal care uptake affecting severity of anemia.

Residents in rural settings experienced greater occurrence (26.1%) than those from the urban setting (15.5%), but not significant ($p=0.129$). This was most likely due to inaccessibility of medical facilities and antenatal care in rural settings, along with lower nutritional intake that can worsen anemia severity and potentially lead to postpartum hemorrhages.

In the current research, the incidence of PPH was found to be 21.90% (32 out of 146) in anemic females post-normal vaginal deliveries, which can be considered similar to Qasim 14 who identified PPH incidence of 13.8% in anticipating PPH in pregnant females, and Adnan et al. 15 who identified PPH incidence of 17.1% in PPH in anemic females. However, in current research, incidence was found to be significantly high in comparison to Feng & Huang 16 who identified PPH incidence of 6.02% in multiparas, and Tabraiz & Awan 17 who identified PPH incidence of 6.3% in PPH in CS deliveries. Incidences can vary due to differences in proportion of PPH in studied population, type of deliveries, and definitions of PPH. Also, in current research, all females included in calculation were anemic, thereby having increased risk of PPH due to increased risk of heavy post-birth bleeding.

The mean hemoglobin level in the current study was 9.14 ± 1.09 g/dL, which represents moderate to severe anemia in the studied population. It was in line with the study of Ashraf [18] that reported 46.1% prevalence of anemia with most cases having mild to moderate disease. In similar studies, Habtamu et al. [19] found pre-operative Hb < 11 g/dL as the most important predictor of postpartum anemia with 14.5 times increased odds. It further strengthens the observation that baseline anemia exerts significant influence on postpartum outcomes. Feng & Huang [16] demonstrated antenatal Hb ≤ 90 g/L to be significant and independent risk factor of PPH with 5.71 times increased odds. It corresponds to the current observation that low hemoglobin status was prone to hemorrhagic alterations.

In terms of age distribution, PPH was found to occur frequently in younger females ≤ 30 years in the current study (28.4%) than in older females (16.5%), although not significant ($P=0.083$). This result contradicts Arshad et al. [20], who found that females above 30 years had significantly greater PPH rates (57.3% vs. 38.9%, $P=0.008$) in cases of placenta previa. The discrepancy in the results can be identified due to the varying clinical settings because placenta previa always poses greater risk irrespective of age. Bai & Fatima [21] identified that the age range of 31-40 years had 82.8% PPH in cases of caesarean section.

In the current study, PPH was found to occur at a greater percentage in rural than in urban residents; although insignificant ($p=0.129$), it was 26.1% in rural and 15.5% in urban. Similar observation was reported by Fayyaz et al. [22], who found that 70.3% cases of PPH resulted in deaths that accessed care from rural settings, and by Arshad et al. [20], whereby 67.8% of all participants comprised rural residents who developed morbidity due to increased morbidity. The low utilization of antenatal care services in rural settings was further evidenced by Ashraf [18], whereby 86.4% of all cases in the anemia

categories comprised multiparae from low dietary habits who took less than half compliance from supplements.

The mean blood loss of 421.97 ± 267.52 mL in the current study nearing the threshold of hemorrhage is alarming. Qasim [14] found that 76.2% of the female population who experienced PPH had anemia in comparison to 23.8% who had no anemia ($p=0.039$), showing strong evidence supporting the link regarding hemostatic disorder resulting in heavy blood loss. Bai & Fatima [21] found that in PPH, 61.3% female population had anemia in comparison to 38.7% who had no anemia ($p < 0.01$), whereas in hemorrhage, 85.7% population had preoperative anemia ($p=0.018$) as shown by Tabraiz & Awan [17].

Socioeconomic status in current study showed no high socioeconomic group experienced PPH (0.0%), while low and middle groups had 20.9% and 28.9% respectively, though not significant ($p=0.134$). Bai & Fatima [21] similarly found that 81.7% of PPH cases belonged to lower family income groups and 80.6% had no formal education. This association likely reflects inadequate nutrition, poor antenatal care utilization, and limited access to preventive interventions in lower socioeconomic strata, which perpetuates anemia and subsequent complications as emphasized by Ashraf [18] who documented that poverty-related poor diet was major driver of high anemia rates.

The present study has several limitations that should be acknowledged. First, this was single center study

conducted at one hospital, which may limit the generalizability of findings to broader population. The sample size of 146 women was relatively small, and larger multi-center studies are needed to validate these results. Additionally, the study did not include non-anemic control group for direct comparison, which could have strengthened the analysis of risk factors. The cross-sectional design prevents establishment of causal relationships between anemia and postpartum hemorrhage.

CONCLUSION

The present study has concluded that frequency of postpartum hemorrhage in pregnant women presenting with prenatal anemia following normal vaginal delivery is considerably high. Anemic women demonstrate increased vulnerability to excessive blood loss during and after delivery due to compromised physiological hemoglobin reserve and impaired uterine contractility. Younger age and rural residency was associated with higher occurrence of postpartum hemorrhage, although these associations were not statistically significant.

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REFERENCES

- Zych-Krekora, K., Sylwestrzak, O., & Krekora, M. (2025). The critical role of iron in pregnancy, puerperium, and fetal development. *Journal of Clinical Medicine*, 14(10), 3482. <https://doi.org/10.3390/jcm14103482>
- Obeagu, G. U., Altraide, B. O., & Obeagu, E. I. (2025). Iron deficiency anemia in pregnancy and related complications with specific insight in Rivers State, Nigeria: A narrative review. *Annals of Medicine & Surgery*, 87(6), 3435-3444. <https://doi.org/10.1097/ms9.0000000000003224>
- Alemu, G. G., Adugna, D. G., Mesfin, A., Agimas, M. C., Baffa, L. D., Abuhay, H. W., Aweke, M. N., Alemu, T. G., & Baykemagn, N. D. (2025). Adherence to iron-folic acid supplementation and its associated factors among pregnant women in Kenya: A multilevel data analysis of the 2022 Kenyan demographic and health survey. *PLOS One*, 20(8), e0329458. <https://doi.org/10.1371/journal.pone.0329458>
- Ramasauskaite, D., Schlembach, D., Ubom, A. E., Nieto-Calvache, A. J., Evans, C., Gülmezoglu, A. M., Beyez-Kashesya, J., Jacobsson, B., & Wright, A. (2025). FIGO call to action: multisectoral approach to postpartum hemorrhage. *International Journal of Gynecology & Obstetrics*, 171(1), 45-53. <https://doi.org/10.1002/ijgo.70449>
- Alonso-Burgos, A., Díaz-Lorenzo, I., Muñoz-Saá, L., Gallardo, G., Castellanos, T., Cardenas, R., & Chiva de Agustín, L. (2024). Primary and secondary postpartum haemorrhage: A review for a rationale endovascular approach. *CVIR Endovascular*, 7(1). <https://doi.org/10.1186/s42155-024-00429-7>
- Mohamed, T. A., & Chandrarahan, E. (2024). Recognition and management of postpartum hemorrhage. *Maternal-Fetal Medicine*, 7(1), 29-37. <https://doi.org/10.1097/fm9.0000000000000256>
- Hamdan, M., Lim, C., Tang, B. N., Abdul Hamid, H., Narayanan, V., Abdul Ghani, N. A., Ismail, M. P., Selvaratnam, V., Wadhawan, S., & Mukherjee, D. (2025). Postpartum haemorrhage burden, management and challenges in Malaysia: A scoping review and expert recommendations for effective management. *Cureus*. <https://doi.org/10.7759/cureus.89915>
- Aimagambetova, G., Bapayeva, G., Sakhipova, G., & Terzic, M. (2024). Management of postpartum hemorrhage in low- and middle-income countries: Emergency need for updated approach due to specific circumstances, resources, and availabilities. *Journal of Clinical Medicine*, 13(23), 7387. <https://doi.org/10.3390/jcm13237387>
- Mansukhani, R., Shakur-Still, H., Chaudhri, R., Bello, F., Muganyizi, P., Kayani, A., Javaid, K., Okunade, O., Olayemi, O., Kawala, A., Temba, R., Bashir, A., Geer, A., Islam, A., Prowse, D., Balogun, E., Joseph, F., Yasmin, H., Khakwani, M., ... Roberts, I. (2023). Maternal anaemia and the risk of postpartum haemorrhage: A cohort analysis of data from the WOMAN-2 trial. *The Lancet Global Health*, 11(8), e1249-e1259. [https://doi.org/10.1016/s2214-109x\(23\)00245-0](https://doi.org/10.1016/s2214-109x(23)00245-0)
- Brenner, A. C., Roberts, I., Balogun, E., Bello, F. A., Chaudhri, R., Fleming, C., Javaid, K., Kayani, A., Lubeya, M. K., Mansukhani, R., Olayemi, O., Prowse, D., Vwalika, B., & Shakur-Still, H. (2021). Postpartum haemorrhage in anaemic women: Assessing outcome measures for clinical trials. <https://doi.org/10.21203/rs.3.rs-868584/v1>
- Ende, H. B., Lozada, M. J., Chestnut, D. H., Osmundson, S. S., Walden, R. L., Shotwell, M. S., & Bauchat, J. R. (2021). Risk factors for atonic postpartum hemorrhage. *Obstetrics & Gynecology*, 137(2), 305-323.

- <https://doi.org/10.1097/aog.0000000000004228>
12. Omotayo, M. O., Abioye, A. I., Kuyebi, M., & Eke, A. C. (2021). Prenatal anemia and postpartum hemorrhage risk: A systematic review and meta-analysis. *Journal of Obstetrics and Gynaecology Research*, 47(8), 2565-2576. <https://doi.org/10.1111/jog.14834>
 13. Abdilahi, M. M., Kiruja, J., Farah, B. O., Abdirahman, F. M., Mohamed, A. I., Mohamed, J., & Ahmed, A. M. (2024). Prevalence of anemia and associated factors among pregnant women at Hargeisa group hospital, Somaliland. *BMC Pregnancy and Childbirth*, 24(1). <https://doi.org/10.1186/s12884-024-06539-3>
 14. Qasim, M. T. (2024). Effect of anemia in pregnancy on postpartum hemorrhage [dissertation]. Diyala University.
 15. Adnan, Z., Nayyar, A., Nayyar, S., & Mehraj, A. (2018). Feto-Maternal Outcome in Pregnancy with Anemia. *Journal of Islamic International Medical College (JIIMC)*, 13(2), 57-61. <https://journals.riphah.edu.pk/index.php/jiimc/article/view/1030>
 16. Feng, N., & Huang, X. (2023). Investigation and analysis of high-risk factors of postpartum hemorrhage in singleton primiparous women: a cross-sectional study. *Int J Clin Exp Med*, 16(2), 31-40. <https://e-century.us/files/ijcem/16/2/ijcem0136496.pdf>
 17. Tabraiz, I., & Awan, A. S. (2012). Frequency of postpartum haemorrhage in caesarean section in anaemic and non anaemic patients. *J Islamabad Med Dental Coll*, 1, 125-8. <https://jimdc.org.pk/jimdc/Volumes/1-3/5-Frequency%20of%20Postpartum%20Haemorrhage%20in%20Caesarean%20Section%20in%20Anaemic%20and%20Non%20Anemic%20Patients.pdf>
 18. Ashraf, B. (2023). Frequency of anemia and associated risk factors among pregnant women; a study from the remote outskirts of Quetta, Balochistan. *Journal of The Society of Obstetricians and Gynaecologists of Pakistan*, 13(2), 82-86. <https://www.jsogp.net/index.php/jsogp/article/view/626>
 19. Habtamu, G., Talie, A., Kassa, T., & Belay, D. M. (2025). Prevalence and associated factors of postpartum anemia after cesarean delivery in public hospitals of Awi zone, north west Ethiopia, 2023; a cross-sectional study. *PLOS ONE*, 20(1), e0311907. <https://doi.org/10.1371/journal.pone.0311907>
 20. Arshad, H., Amin, N., Shah, M. H., Gul, S., & Shahrugh. (2025). Maternal and fetal outcome in women with placenta Previa presenting at Mardan medical complex. *Journal of Bacha Khan Medical College*, 6(01), 68-76. <https://doi.org/10.69830/jbkmc.v6i1.227>
 21. Bai, P. (2022). Postpartum Hemorrhage After Cesarean Section In Anemic and Non Anemic Patients. *Journal of Surgery Pakistan*, 27(2), 65-69. <https://www.jsp.org.pk/index.php/jsp/article/view/319>
 22. Fayyaz, S., Faiz, N. R., Rahim, R., & Fawad, K. (2011). Frequency of postpartum haemorrhage in maternal mortality in a tertiary care hospital. *Journal of Postgraduate Medical Institute*, 25(3). <https://jpmi.org.pk/index.php/jpmi/article/view/1170>