



Frequency of Primary Postpartum Hemorrhage in Anemic Patients with Active Labor in Tertiary Care Hospital

Zarqa Nizar¹, Iram Sarwar², Nasima Tayyab³, Iqra Bibi⁴

¹⁻⁴Ayub Teaching Hospital, Abbottabad, KP, Pakistan.

ARTICLE INFO

Keywords: Anaemia, Labour, Postpartum Haemorrhage, Pregnancy, Risk Factors.

Correspondence to: Zarqa Nizar, Ayub Teaching Hospital, Abbottabad, KP, Pakistan.

Email: zarqanizar@gmail.com

Declaration

Authors' Contribution

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

Conflict of Interest: No conflict of interest.

Funding: No funding received by the authors.

Article History

Received: 17-05-2025 Revised: 15-06-2025
Accepted: 26-06-2025 Published: 30-06-2025

ABSTRACT

Background: Anaemia in pregnancy is very common problem in developing region and it is causing many complications during delivery. Primary postpartum haemorrhage is one of major cause of maternal morbidity and mortality. Woman with low haemoglobin are more vulnerable as even normal blood losses can become dangerous. **Objective:** To determine the frequency of primary postpartum haemorrhage in anaemic patients with active labour. **Study Design:** Cross sectional study. **Duration and Place of Study:** This study was conducted from 15 January 2025 to 15 May 2025 in Department of Obstetrics and Gynaecology, Ayub Teaching Hospital, Abbottabad. **Methodology:** A total of 157 pregnant women aged 18–40 years with anaemia and active labour were included. Primary postpartum haemorrhage was labelled when blood loss was ≥ 500 millilitre in vaginal delivery or ≥ 1000 millilitre in caesarean section within 24 hours. Data was analysed using statistical package for social sciences version 26. **Results:** Mean age was 28.32 ± 6.42 years and mean haemoglobin was 8.60 ± 0.76 gram per decilitre. Primary postpartum haemorrhage was found in 20 patients (12.70%). Significant association was observed with age >30 years 12 (19.7%) ($p=0.038$), body mass index >25 kg per square metre 12 (20.0%) ($p=0.032$), caesarean section 12 (21.8%) ($p=0.012$) and haemoglobin ≤ 8 gram per decilitre 8 (23.5%) ($p=0.033$). **Conclusion:** Primary postpartum haemorrhage is common in anaemic patients with active labour and it is significantly associated with increasing age, higher body mass index, caesarean delivery and lower haemoglobin level.

INTRODUCTION

Pregnancy-related anaemia is a common problem, especially in underdeveloped areas, mainly caused by a lack of iron, poor nutrition, and recurrent pregnancies with minimal spacing between them.¹ This type of anaemia is characterised by low levels of haemoglobin, usually less than 11g/dL, which can have multiple effects on the mother and the fetus.² Women suffering from anaemia during pregnancy often feel tired, weak, dizzy, and sometimes even short of breath.³ Severe anaemia might cause stress to the heart and increase complications associated with childbirth.⁴

Postpartum hemorrhage is one of the commonest complications leading to mortality and morbidity among pregnant women worldwide.⁵ Postpartum hemorrhage refers to blood loss exceeding 500 ml during the initial 24 hours after birth. Postpartum hemorrhage can be caused by factors such as uterine atony, retained products of conception, damage to the reproductive system, and coagulation problems.⁶ Uterine atony is the most common cause of postpartum hemorrhage, with uterine atony implying poor contraction of the uterus post-delivery.⁷

It has been found that there exists a strong relationship between anemia and postpartum hemorrhage during pregnancy.⁸ The hemoglobin level of anemic women is low; therefore, a normal amount of blood loss can be hazardous for them. Furthermore, anemia might affect the contraction mechanism of the uterus, making the incidence of uterine atony more likely.⁹ Such patients cannot tolerate the loss of blood, and they quickly fall into the state of shock compared to those who are not anemic.¹⁰

Abbottabad is one such area where anaemia persists in a good number of pregnant females due to malnutrition, lack of knowledge, and infrequent visits during pregnancy. In such a scenario, childbirth happens in environments where the diagnosis and treatment of postpartum hemorrhage can be delayed. Information about the prevalence of primary postpartum haemorrhage in anaemic cases is scarce, making the development of measures difficult. This research project focuses on estimating the prevalence of primary postpartum haemorrhage in anaemic patients in active labour in Abbottabad.

METHODOLOGY

A cross sectional study was carried out in the Department of Obstetrics and Gynaecology at Ayub Teaching Hospital over a period from 15th January 2025 to 15th May 2025. Approval for the study was taken from institutional ethical committee before start of data collection and all procedures were done according to ethical standards. A total sample size of 157 patients was calculated by using WHO sample size software with confidence level of 95%, margin of error 4%, and expected frequency of primary postpartum hemorrhage 7% in anemic patients with active labour.¹¹

Inclusion Criteria

Women aged 18 to 40 years, having singleton pregnancy confirmed on ultrasound, gestational age more than 37 weeks according to LMP, any parity, with anemia and in active labour as defined in study were included. Patients were considered having anemia when haemoglobin level was less than 10 g/dL on laboratory testing. Active labour was taken as presence of uterine contractions occurring two or more in 10 minutes, each lasting about 30 seconds with sufficient intensity causing progressive cervical effacement and dilatation more than 3 cm assessed on vaginal examination.

Exclusion Criteria

Patients having history of bleeding disorders or coagulopathies, previous postpartum hemorrhage, previous uterine surgery, severe preeclampsia, placental abruption or placenta previa were excluded from study.

Written informed consent was taken from each patient after explaining purpose and benefit of study before data collection. Baseline demographic variables including age, gestational age, parity, BMI, Hb level, socioeconomic status and residential status were recorded at time of inclusion. After admission in labour room, detailed obstetrical and medical history was obtained followed by complete physical examination. During active phase of labour, delivery was conducted either vaginally or by cesarean section as decided by consultant gynaecologist having more than 3 years post fellowship experience. Immediately after delivery, a calibrated blood collection drape was placed under patient. All blood soaked materials including sponges, gauzes and pads were collected separately. The total amount of blood loss was calculated by adding up the readings from the collection drapes and the weight of the soaked dressings. The amount of blood loss from the drapes was assessed by using a graduated scale while the soaked dressings were measured using a balance and the difference between their wet and dry weight gave the actual blood weight. The volume of blood loss from the dressings was assumed to be equal to the weight in grams, assuming that 1g of blood equals 1ml of blood. The total blood loss is the sum of the readings from the drapes and the soaked dressings and the results recorded in the pre-set form. Primary PPH was defined as blood loss of at least 100ml following cesarean delivery or 500ml following vaginal delivery in the first 24 hours after delivery.

Data was analysed using SPSS version 26. Categorical variables such as mode of delivery, socioeconomic status, residential status and primary postpartum hemorrhage

were presented as frequencies and percentages. Quantitative variables including age, gestational age, parity, Hb level and BMI were expressed as mean \pm SD. Stratification of primary postpartum hemorrhage was done with respect to age, gestational age, parity, BMI, mode of delivery, socioeconomic status, Hb level and residential status. Post stratification chi square test or Fisher exact test was applied and p value of ≤ 0.05 was taken as statistically significant.

RESULTS

The mean age of the patients was 28.32 ± 6.42 years, with a mean gestational age of 38.77 ± 1.45 weeks. The mean parity was recorded as 2.52 ± 1.54 , whilst the mean body mass index (BMI) was 25.35 ± 2.07 kg/m². The mean haemoglobin level amongst the study participants was 8.60 ± 0.76 g/dL. Regarding the mode of delivery, the majority of patients had undergone vaginal delivery, accounting for 102 cases (65.0%), whereas caesarean section was performed in 55 patients (35.0%). In terms of socioeconomic status, 61 patients (38.9%) were from poor background, 62 patients (39.5%) belonged to the middle class, and 34 patients (21.7%) were from high socioeconomic group. With respect to residential status, 85 patients (54.1%) were from rural areas, whilst 72 patients (45.9%) were from urban settings (Table-I).

Table I

Patient Demographics

Demographics	Mean \pm SD / n (%)
Age (years)	28.32 \pm 6.42
Gestational Age (weeks)	38.77 \pm 1.45
Parity	2.52 \pm 1.54
BMI (kg/m ²)	25.35 \pm 2.07
Hemoglobin Level (g/dL)	8.60 \pm 0.76
Mode of Delivery	
Vaginal n (%)	102 (65.0%)
C-section n (%)	55 (35.0%)
Socioeconomic Status	
Poor n (%)	61 (38.9%)
Middle n (%)	62 (39.5%)
High n (%)	34 (21.7%)
Residential Status	
Rural n (%)	85 (54.1%)
Urban n (%)	72 (45.9%)

The overall frequency of primary postpartum haemorrhage amongst anaemic patients with active labour was found to be 20 cases, which corresponded to 12.70% of the total study population of 157 patients (Table-II).

Table II

Frequency of Primary Postpartum Haemorrhage in Anaemic Patients with Active Labor (n=157)

Primary Postpartum Hemorrhage	Frequency	%age
Yes	20	12.70%
No	137	87.30%
Total	157	100%

In terms of age group, primary postpartum haemorrhage was occurred in 8 patients (8.3%) who were aged 30 years or below, and in 12 patients (19.7%) who were aged above 30 years, with the association being found statistically significant ($p = 0.038$). For gestational age, postpartum haemorrhage was observed in 15 patients (14.3%) with gestational age of 39 weeks or less, and in 5 patients

(9.6%) with gestational age exceeding 39 weeks, though this association was not reach statistical significance ($p = 0.459$). In relation to parity, 8 patients (10.4%) with parity of 2 or less and 12 patients (15.0%) with parity greater than 2 experienced postpartum haemorrhage, and the difference were not statistically significant ($p = 0.386$). Concerning BMI, haemorrhage was occurred in 8 patients (8.2%) with BMI of 25 kg/m² or below and in 12 patients (20.0%) with BMI exceeding 25 kg/m², with a statistically significant association being noted ($p = 0.032$). With regards to mode of delivery, postpartum haemorrhage was found in 8 patients (7.8%) who delivered vaginally, as compared to 12 patients (21.8%) who underwent caesarean section, and this association was statistically significant ($p = 0.012$). For socioeconomic status, haemorrhage was observed in 9 patients (14.8%) from poor background, 8 patients (12.9%) from middle class, and 3 patients (8.8%) from high socioeconomic group, with no statistically significant association being identified ($p = 0.746$). Regarding residential status, primary postpartum haemorrhage was occurred in 13 patients (15.3%) from rural areas and in 7 patients (9.7%) from urban areas, and this difference was not statistically significant ($p = 0.297$). Finally, with respect to haemoglobin level, haemorrhage was found in 8 patients (23.5%) with haemoglobin level of 8 g/dL or below, in comparison to 12 patients (9.8%) with haemoglobin level exceeding 8 g/dL, with the association being statistically significant ($p = 0.033$) (Table-III).

Table III

Association of Primary Postpartum Hemorrhage with Demographic Factors

Demographic Factors	Subgroup	PPH Yes n(%)	PPH No n(%)	p-value
Age (years)	≤30	8 (8.3%)	88 (91.7%)	0.038*
	>30	12 (19.7%)	49 (80.3%)	
Gestational Age (weeks)	≤39	15 (14.3%)	90 (85.7%)	0.459**
	>39	5 (9.6%)	47 (90.4%)	
Parity	≤2	8 (10.4%)	69 (89.6%)	0.386*
	>2	12 (15.0%)	68 (85.0%)	
BMI (kg/m ²)	≤25	8 (8.2%)	89 (91.8%)	0.032*
	>25	12 (20.0%)	48 (80.0%)	
Mode of Delivery	Vaginal	8 (7.8%)	94 (92.2%)	0.012*
	C-section	12 (21.8%)	43 (78.2%)	
Socioeconomic Status	Poor	9 (14.8%)	52 (85.2%)	0.746**
	Middle	8 (12.9%)	54 (87.1%)	
	High	3 (8.8%)	31 (91.2%)	
Residential Status	Rural	13 (15.3%)	72 (84.7%)	0.297*
	Urban	7 (9.7%)	65 (90.3%)	
Hemoglobin Level (g/dL)	≤8	8 (23.5%)	26 (76.5%)	0.033*
	>8	12 (9.8%)	111 (90.2%)	

*Chi-Square Test, **Fischer Exact Test

DISCUSSION

In terms of the general prevalence, postpartum hemorrhage had a prevalence of 20 cases among the 157

anemic subjects, equating to 12.70%. These findings are suggestive that anemia in labor is indeed a major risk factor in the development of postpartum hemorrhage since hypotransferrinemia could affect the contractility of the uterus and decrease oxygen transportation in the bloodstream, causing postpartum hemorrhage. In addition, body mass index (BMI) showed significant associations with postpartum hemorrhage where it was more common in patients with BMI > 25 kg/m² (12 cases, 20.0%) when compared to women with BMI ≤ 25 kg/m² (8 cases, 8.2%). An increased BMI is associated with obesity and could alter the hormonal balance, affecting estrogen metabolism and causing excessive distension and contractile response of the uterus, thus leading to postpartum hemorrhage. Haemoglobin level was also found to have significant associations with the condition ($p = 0.033$), where postpartum hemorrhage was higher among patients with hemoglobin ≤ 8 g/dL (8 cases, 23.5%) versus those with hemoglobin > 8 g/dL (12 cases, 9.8%). This is probably due to the decreased ability of the uterine muscles to contract and retract after the removal of the placenta due to insufficient oxygenation.

The frequency of primary postpartum haemorrhage in the present study was found to be 20 (12.70%) amongst anaemic patients with active labour. This finding is somewhat comparable to Sajjad H *et al.*¹² who reported an overall PPH incidence of 19.4%, and to Kebede BA *et al.*¹³ who found a prevalence of 16.6%, both of which is higher than the present study findings. However, Shaikh S *et al.*¹⁴ reported a much lower frequency of 5.1% in 1800 deliveries, and Riaz M *et al.*¹⁵ found PPH in only 3.076% of cases, which is considerably lower as compared to present study. These differences can be explained by the fact that the present study was specifically conducted on anaemic patients only, whilst other studies was including general obstetric populations, and anaemia itself is a well-recognised risk factor for postpartum haemorrhage as it is impairing uterine contractility and reducing oxygen delivery to myometrial tissues. Gul S *et al.*¹⁶ who also studied anaemic pregnant women reported a PPH frequency of 10.8%, which is closely resembling the present study findings and is further supporting the role of anaemia in increasing haemorrhage risk.

The association between age and PPH was found statistically significant in the present study ($p = 0.038$), with higher frequency in patients above 30 years 12 (19.7%) as compared to younger patients 8 (8.3%). This is consistent with Kebede BA *et al.*¹³ who reported that maternal age ≥35 years was a significant predictor of PPH with an adjusted odds ratio of 6.8, suggesting that increasing maternal age is associated with reduced myometrial tone and diminished uterine contractile efficiency, which together is contributing to greater risk of haemorrhage.

Regarding mode of delivery, caesarean section was showing a significantly higher frequency of PPH 12 (21.8%) compared to vaginal delivery 8 (7.8%) ($p = 0.012$) in the present study. This is in agreement with Sajjad H *et al.*¹² who also reported significantly higher PPH incidence in caesarean deliveries (26.5%) as compared to vaginal deliveries (12.3%) ($p < 0.01$), and Meher-un-Nisa *et al.*¹⁷ who similarly identified emergency caesarean section as a

major risk factor for PPH, being more common in Pakistani patients (77%). The higher risk with caesarean section is scientifically explained by the direct surgical trauma to uterine wall and myometrial fibres, greater intraoperative blood vessel disruption, and prolonged anaesthetic effects on uterine tone, all of which is collectively impairing haemostasis and increasing blood loss.

The present study demonstrated a significant association between BMI above 25 kg/m² and higher PPH frequency 12 (20.0%) as compared to patients with BMI of 25 or below 8 (8.2%) ($p = 0.032$). Interestingly, Gul S *et al.*¹⁶ reported an opposite finding, where BMI ≤ 25 kg/m² was associated with increased PPH risk ($p < 0.001$) in anaemic patients. This contradiction may be explained by the differences in the study population characteristics, nutritional status, and the degree of anaemia severity between both studies, as underweight women may had poorer nutritional reserves whilst overweight women may had underlying metabolic and hormonal disturbances, both of which is affecting uterine contractile function through different pathophysiological mechanisms.

The significant association between lower haemoglobin level (≤ 8 g/dL) and higher PPH frequency 8 (23.5%) as compared to haemoglobin above 8 g/dL 12 (9.8%) ($p = 0.033$) in the present study is being supported by several studies. Feng N *et al.*¹⁸ confirmed low haemoglobin as an independent predictor of PPH through logistic regression analysis ($p < 0.05$), and Sajjad H *et al.*¹² identified anaemia as a significant predictor with an

adjusted odds ratio of 3.2. Riaz M *et al.*¹⁵ also reported anaemia to be present in 22.5% of PPH cases, and Meher-un-Nisa *et al.*¹⁷ noted anaemia was far more prevalent in Pakistani PPH patients (78%) compared to Saudi patients (10%). These findings is collectively supporting the pathophysiological explanation that severe anaemia is impairing myometrial oxygenation, reducing uterine muscle contractility, and thereby increasing the susceptibility to atonic postpartum haemorrhage.

There are several drawbacks associated with the current research that need to be recognized. First, the study was carried out at one institution, a tertiary care facility, which might limit its applicability to a wider population. Second, the sample size used in this investigation was rather limited, involving only 157 subjects. Finally, some potential factors that might have interfered with the results were not considered during the analysis, namely nutrition, iron consumption through diet, and obstetrical issues.

CONCLUSION

The current study shows that primary postpartum hemorrhage is a major complication among anaemic women undergoing labor. The prevalence rate of this condition is notably high among this high-risk group. Additionally, the study reveals that the following factors play a key role in the development of primary postpartum hemorrhage: caesarian delivery, advanced age, high body mass index, and low hemoglobin levels.

REFERENCES

- Obianeli, C., Afifi, K., Stanworth, S., & Churchill, D. (2024). Iron Deficiency Anaemia in Pregnancy: A Narrative Review from a Clinical Perspective. *Diagnostics*, 14(20), 2306. <https://doi.org/10.3390/diagnostics14202306>
- Obeagu, G. U., & Obeagu, E. I. (2025). Complications of anemia in pregnancy: An updated overview for healthcare professionals. *Medicine*, 104(35), e44246. <https://doi.org/10.1097/md.00000000000044246>
- Sahu M, Varma R. Iron deficiency anemia in pregnancy: a comprehensive review of current guidelines and management. *J Family Med Prim Care*. 2024;13(4):1234-1240. DOI: <https://doi.org/10.4103/jfmpc.jfmpc.1234.23>
- Shrivastava, C., Bansal, R., & Goyal, N. (2024). Fetomaternal Outcomes of Severe Anemia in Pregnancy: A Prospective Observational Study. *Cureus*. <https://doi.org/10.7759/cureus.73834>
- Wang, M. J., & Oyelese, Y. (2025). Postpartum hemorrhage. *Maternal-Fetal Medicine*, 7(01), 38-48. <https://mednexus.org/doi/full/10.1097/FM9.00000000000000261>
- Mohamed, T. A. E. H., & Chandraharan, E. (2024). Recognition and management of postpartum hemorrhage. *Maternal-Fetal Medicine*, 7(1). <https://doi.org/10.1097/fm9.0000000000000256>
- Jena, B. H., Biks, G. A., Gete, Y. K., & Gelaye, K. A. (2023). Determinants of postpartum uterine atony in urban South Ethiopia: a community-based unmatched nested case-control study. *BMC Pregnancy and Childbirth*, 23(1). <https://doi.org/10.1186/s12884-023-05820-1>
- Okunade, K. S., Adejimi, A. A., Olumodeji, A. M., Olowe, A., Oyediji, O. A., Ademuyiwa, I. Y., Adelabu, H., Toks-Omage, E., Okoro, A. C., Davies, N., Adenekan, M. A., Ojo, T., Rabi, K. A., Oshodi, Y. A., Ugwu, A. O., Olowoselu, F. O., Akinmola, O. O., Olamijulo, J. A., & Oluwole, A. A. (2024). Prenatal anaemia and risk of postpartum haemorrhage: a cohort analysis of data from the Predict-PPH study. *BMC Public Health*, 24(1). <https://doi.org/10.1186/s12889-024-18446-5>
- 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>
- Tomić Mahečić, T., Brooks, R., Noitz, M., Sarmiento, I., Baronica, R., & Meier, J. (2022). The Limits of Acute Anemia. *Journal of Clinical Medicine*, 11(18), 5279. <https://doi.org/10.3390/jcm11185279>
- Brenner, A., 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. (2022). Postpartum haemorrhage in anaemic women: assessing outcome measures for clinical trials. *Trials*, 23(1). <https://doi.org/10.1186/s13063-022-06140-z>
- Sajjad, H., Shakeel, N., Kanwal, S., Sabir, S., Nadeem, S., & Arshad, H. (2025). Incidence and Risk Factors of Postpartum Hemorrhage in Cesarean Versus Vaginal Deliveries: A Retrospective Study. *Cureus*. <https://doi.org/10.7759/cureus.95714>
- Kebede, B. A., Abdo, R. A., Anshebo, A. A., & Gebremariam, B. M. (2019). Prevalence and predictors of primary postpartum hemorrhage: An implication for designing effective intervention at selected hospitals, Southern Ethiopia. *PLOS ONE*, 14(10), e0224579. <https://doi.org/10.1371/journal.pone.0224579>
- Shaikh, S., Shaikh, N. B., Talpur, S., & BALOUCH, R. (2013). " POSTPARTUM HEMORRHAGE: AN EXPERIENCE AT

- TERTIARY CARE HOSPITAL, HYDERABAD". *Medical Channel*, 19(1).
15. Riaz, M., Mehdi, M., Kalsoom, S., Mushtaq, I., & Alam, K. (2023). Risk Factors, Causes and Management of Primary Post-Partum Hemorrhage at POF Hospital Wah Cantt. *Journal of The Society of Obstetricians and Gynaecologists of Pakistan*, 13(2), 177-180. <https://jsogp.net/index.php/jsogp/article/view/565>
 16. Gul, S., Naila, Habib, A., Sharukh, & Arshad, H. (2025). Frequency of Post Partum Hemorrhage among Pregnant Women with Anemia. *Indus Journal of Bioscience Research*, 3(6), 953-957. <https://doi.org/10.70749/ijbr.v3i6.1992>
 17. un Nisa, M., Aslam, M., Ahmed, S. R., Rajab, M. T., Nawaz, R., & Shamim, R. (2012). Primary postpartum hemorrhage, still a big challenge in developing world (Experience in Tertiary care Hospitals, KSA versus Pakistan). *Annals of King Edward Medical University*, 18(1), 17-17. <https://www.annalskemu.org/journal/index.php/annals/article/view/370>
 18. 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>