

RESEARCH PAPER

Is anaemia a risk factor for postpartum haemorrhage ?

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Abstract

Background: postpartum haemorrhage (PPH) remains a serious problem for pregnant women worldwide. Anaemia is one of the most prevalent nutritional deficiency illnesses affecting pregnant women. Anaemia has been linked to an increased incidence of postpartum bleeding. The study aimed to Evaluate the relationship between postpartum haemorrhage and anaemia, particularly to determine whether anaemia is a risk factor for PPH or not.

Subjects and Methods: a prospective case-control study was conducted in the Basra Maternity and Children Hospital in Basra, Iraq, during the period from January 1, 2023, to September 1, 2023. Each woman included is subjected to a full history, examination, and Hb level to determine the level of anaemia.

Results: the study involved 125 women including 81 pregnant women who had anaemia and developed post-partum haemorrhage and 44 pregnant women who had anaemia but didn't develop PPH after normal vaginal delivery. PPH was developed in 64.8% of the pregnant ladies, and it was mild in 65.4% of the cases and severe in 34.6% of them. Multiparity, higher gestational age, and lack of antenatal care (ANC) are associated with a high prevalence of PPH, but this association was not significant with parity and gestational age and only significant with ANC ($P < 0.05$). Severe anaemia with Hb levels below 8 g/dl is significantly associated with the development of PPH ($P < 0.05$), and severe anaemia is also significantly associated with the occurrence of severe PPH ($P < 0.01$).

Conclusion: severe anaemia with an Hb level below 8 g/dl is significantly associated with an increase in the risk of PPH. It is also associated with significantly increasing the severity of PPH.

Keywords: anaemia, postpartum, haemorrhage, Basrah.

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Introduction

The most frequent and deadly consequence of delivery is obstetric hemorrhage. The American Academy of Obstetrics and Gynaecology characterised this in 2017 as a cumulative blood loss higher than 1000 mL with signs and symptoms of hypovolemia within 24 hours of the birth process, irrespective of the mode of delivery. Although this update was made

with the awareness that blood loss during birth is regularly underestimated, blood loss after vaginal delivery above 500 mL should be regarded as abnormal and may need intervention.^{1,2} Uterine atony, or ineffective uterine contraction, is the most frequent cause of postpartum haemorrhage. Postpartum haemorrhage in a prior pregnancy is a substantial risk factor, and physicians must make every attempt to determine its severity and underlying reason.³ The primary cause of morbidity and death in delivery is postpartum haemorrhage. PPH affects between 1 and 6 percent of births. 70% to 80% of all haemorrhage is caused by uterine atony, the major cause of

postpartum bleeding.⁴ Anaemia is one of the most prevalent nutritional deficiency illnesses affecting pregnant women, with incidence rates of 14% in affluent nations and 51% in underdeveloped nations.⁵ The risk of PPH is considerably increased by maternal anaemia.^{6,7} Almost a third of all pregnant women (around 30 million) are anaemic, with sub-Saharan Africa and South Asia having the highest frequency.⁸ Because anaemia lowers the blood's oxygen-carrying capacity, anaemic women are more susceptible to tissue hypoxia, morbidity, and mortality following PPH.^{9,10} Anaemia affects 32 million pregnant women globally. Due to the prevalence of dietary iron deficiency, hemoglobinopathies, macronutrient deficiencies, and diseases such as malaria, HIV, and hookworm infestation, women in low- and middle-income countries are at a greater risk of anaemia than women in high-income countries.¹¹ Low haemoglobin levels (11 g/dL and below) during the intrapartum period should be noted since it is indicative of anaemia in pregnant women, allowing healthcare workers to be proactive in the prevention of PPH.¹² Globally, anaemia in pregnancy is an important public health issue.¹³ It has long been believed that anaemia increases the risk of postpartum haemorrhage.¹⁴ Severe anaemia has been proven to impair myometrial contractility as a consequence of decreased haemoglobin and oxygen transfer to the uterus, leading to tissue enzymes and cellular malfunction¹⁵ This study aims to evaluate the relationship between postpartum haemorrhage and anaemia, particularly to determine whether anaemia is a risk factor for PPH or not.

Methods

A prospective case-control study was conducted in the labor ward of the Obstetrical Department of Basra Maternity and Children Hospital in Basra City/Iraq during the period from 1st of January 2023 to 1st of September 2023. Pregnant women who were admitted to labor ward for vaginal delivery at the Obstetrical Department of Basra Maternity and Children Hospital with anemia were included in the study population. Inclusion criteria included women with Singleton pregnancy and Gestational age 37 weeks and more (based on early first-trimester ultrasonography and/or LMP). While those Parity more than five children, Twin pregnancy, Previous PPH, Bleeding tendency, and polyhydramnios were excluded from the study. The study involved 125 pregnant ladies, 81 pregnant women who had anemia and develop post-partum hemorrhage and 44 pregnant women who had anemia and didn't develop PPH after normal vaginal delivery.

The data was collected from women who were included in the study through a well-formed questionnaire developed for the study. They were asked about:

- Socio-demographic characteristics such as Age, residency, and education.
- Pregnancy-related variables: Gravidity, parity, previous miscarriage, previous mode of delivery, gestational age by weeks, and antenatal care status.

Each woman was included in this study after taking a full history and examination. Clinical evaluation and routine investigation including initial haemoglobin levels, urine analysis and other tests were performed as indicated. The gestational age was calculated by LMP or by ultrasound. The severity of PPH was determined subjectively according to the vital signs, and Hb level (gm/dl) after delivery. Data was entered using computerized statistical software; Statistical Package for Social Sciences (SPSS) version 26 was used. The appropriate statistical tests were performed, a Chi-square test was used for categorical variables (Fisher's exact test was used when the expected variable was less than 5), and two samples independent t-tests for the continuous variable. In all statistical analyses, the level of significance (p-value) is set at ≤ 0.05 . This study has been approved by the Ethics Committee of the Faculty of Medicine at Basrah University. An informed consent was taken from each participating woman. And the Confidentiality of data was taken into consideration.

Results

The study involved 125 women, their mean age was 30.76 ± 7.36 years. Most of them (48.8%) were between 30-39 years. Regarding the residency, the majority of women lived in urban areas. About the educational level, 48.0% of women had a primary education, and 77.6% of women were multipara. While only 22.4% were primipara. The mean of their gestational age was 38.4 ± 1.25 weeks. Regarding their antenatal care, 76.2% of women had a positive history of ANC. All these data are presented in (Table-1).

Table 1. The sociodemographic and clinical characteristics of the participant women

Variables		No. (%)
Age	Mean \pm SD	30.76 ± 7.36 (16-42)
	< 20	9 (7.2)
	20-29	42 (33.6)
	30-39	61 (48.8)
	≥ 40	13 (10.4)
Residency	Rural	46 (36.8)
	Urban	79 (63.2)
Educational level	Illiterate	34 (27.2)
	Primary	60 (48.0)
	Secondary and above	31 (24.8)
Parity	Primipara	28 (22.4)
	Multipara	97(77.6)
Gestational age	Mean \pm SD (range)	38.4 ± 1.25 (35-41)
ANC	No	50 (40.0)
	Yes	75 (60.0)
Hb level	Moderate anemia (8.1-10 g/dl)	86 (68.8)
	Severe anemia (≤ 8 g/dl)	39 (31.2)
Total		125 (100.0)

The participants were divided into two groups, those who developed PPH were 81 women and those who did not develop PPH were 44 women as seen in (Figure -1).

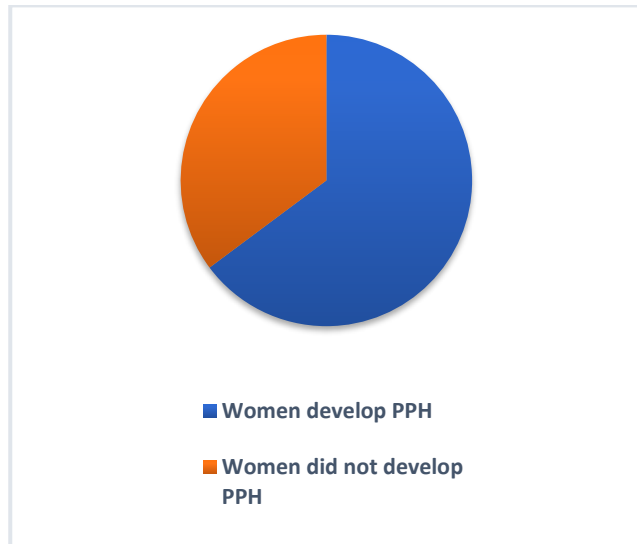


Fig 1. The development of postpartum hemorrhage among participating women.

Table-2, shows the association between postpartum hemorrhage and pregnancy-related characteristics. In regards to parity, there are no significant statistical differences between the two groups. P-value = 0.701. The mean of gestational age was nearly similar for both groups and there are no significant statistical differences between them. P-value = 0.061. In the history of ANC, there is a significant statistical difference between the groups. P-value = 0.01. Around 82% of women with severe anaemia developed PPH while 17.9 % of them didn't develop PPH.

Table 2. The association between postpartum hemorrhage and pregnancy-related characteristic

		Develop PPH	Not develop PPH	Total	p-value
Parity	Primipara	19 (67.9)	9 (32.1)	28 (100.0)	0.701
	Multipara	62 (63.9)	35 (36.1)	97(100.0)	
Gestational age	Mean \pm SD	38.5 \pm 1.4	38.1 \pm 1.1	38.4 \pm 1.25	0.061
ANC	No	39 (78.0)	11 (22.0)	50 (100.0)	0.011
	Yes	42 (56.0)	33 (44.0)	75 (100.0)	
Total		81 (64.8)	44 (35.2)	125 (100.0)	

There was a significant statistical association between the Hb level and subsequent development of PPH. P-value = 0.006 as shown in (Table-3).

Table 3. The association between postpartum hemorrhage and Hb level

		Develop PPH	Not develop PPH	Total	p-value
Hb level	Moderate anemia (8.1-10 g/dl)	49 (56.9)	37(43.1)	86 (100.0)	0.006
	Severe anemia (< 8 g/dl)	32 (82.1)	7(17.9)	39 (100.0)	
Total		81 (64.8)	44 (35.2)	125 (100.0)	

For the first group, the association between the severity of PPH and women's Hb level was studied. There is a significant statistical association between severe anaemia and subsequent development of severe PPH. 82.2% of women with moderate anaemia develop mild PPH and 63.3% of women with severe anaemia develop severe PPH. As shown in (Table-4).

Table 4. The association between PPH severity and Hb level

		Mild PPH	Severe PPH	Total	p-value
Hb level	Moderate anemia (8.1-10 g/dl)	42 (82.4)	9 (17.6)	51 (100)	0.001
	Severe anemia (<8 g/dl)	11(36.7)	19 (63.3)	30 (100)	
Total		53 (65.4)	28(34.6)	81(100.0)	

Discussion

Postpartum haemorrhage (PPH) continues to be a significant concern for pregnant individuals on a global scale. Postpartum haemorrhage is a critical obstetric emergency that may lead to many complications, including hypotension, anaemia, and exhaustion. These complications have a significant impact on the recovery of the puerperal period and can pose a life-threatening risk to the mother, particularly in severe instances.¹⁶ The present study revealed that 77.6% of pregnant individuals experiencing PPH were multiparous women. This conclusion aligns with the results of the aforementioned research and a separate study conducted by Ismail et al.¹⁷ in Iraq, which also observed a notable incidence of PPH among women with multiple pregnancies. This lack of significance might perhaps be related to the presence of other pre-existing risk factors

for PPH or to the limited sample size, which may have impacted the statistical power. Furthermore, our study revealed a statistically significant association between inadequate prenatal care use among women and an increased susceptibility to PPH. This discovery aligns with the research conducted by Muluye, et al.¹⁸, which demonstrates that the absence of maternal health assessments during the antepartum period poses a significant risk for primary postpartum haemorrhage. This phenomenon might be attributed to the observation that women who do not get ANC visits are at a higher likelihood of encountering undetected problems and opting for non-institutional delivery, both of which elevate the chance of developing primary PPH. Our study revealed a substantial association between severe anaemia, defined as a haemoglobin (Hb) level below 8 ²⁰g/dl, and an elevated risk of PPH. Frass¹² conducted research which revealed that 29.1% of women with anaemia had PPH as a result of uterine atony. The study further indicated that the elevated risk of PPH occurred in instances where the Hb level was below 7 g/dl. Notably, this Hb threshold is somewhat lower than our established cut-off point. Additionally, the study found that 39.6% of the cases in the study population had Hb levels below this threshold, which is lower than our observed proportion of 82.1% of those with severe anemia (Hb below 8 g/dl) and developed severe PPH. According to Frass¹² it has been shown that anaemia might potentially hinder the contractility of the myometrium as a result of compromised transportation of haemoglobin and oxygen to the uterus. This impairment may lead to disruptions in tissue enzymes and cellular processes. In a recent investigation conducted by Omotayo et al.¹⁹ it was shown that there exists a positive correlation between severe anaemia and an increased likelihood of postpartum haemorrhage,

although such an association was not seen for mild and moderate anaemia. A recent clinical experiment conducted in 2023, known as the World Maternal Antifibrinolytic-2 (WOMAN-2) trial, revealed that women with moderate anaemia had a 6.2% probability of encountering postpartum haemorrhage after delivery. However, the risk escalated to 11.2% for women with more severe anaemia. The study found that women who had severe anaemia had a much higher risk of mortality or near-mortality due to severe bleeding compared to those with moderate anaemia, with a seven-fold increase in likelihood.²⁰ The majority of the patients in our study (65.4%) exhibited mild postpartum haemorrhage (< 1000 ml). This finding contrasts with the results published by Frass¹², who noted that about 90% of their cases had blood loss over 1500 ml. The observed variance may be partially attributed to the active treatment of the third stage of labour that was administered to all female participants in our research to mitigate the occurrence of excessive blood loss. Several studies have been conducted that establish a correlation between the risk of severe PPH and the degree of anaemia, suggesting a tenuous relationship. In the present investigation, a strong and statistically significant correlation was seen between severe anaemia, defined as an Hb level below 8 g/dl, and the likelihood of experiencing severe PPH. Specifically, our findings indicate that 63% of individuals with severe anaemia suffered severe PPH, while only 17% of those with moderate anaemia experienced the same complication. The aforementioned findings provided further support for the established notion of the impact of anaemia on uterine contractions, as shown in the study conducted by Brenner et al.²¹ Nevertheless, the majority of the research documented a threshold value of Hb below 7, which is comparatively lower than the

cut-off point we used. This project will provide obstetricians with a novel and advanced tool for identifying pregnant women who are in danger, enabling them to provide them with appropriate standards of care. The significance of our findings may catalyze researchers to actively investigate and tackle the identified problem. The current investigation exhibits certain constraints. The sample size used in our study was limited in scope and may not accurately reflect the characteristics of the whole population. Furthermore, it should be noted that our assessment does not include all potential risk variables associated with PPH, which represents an additional limitation in our study.

In conclusion, severe anaemia with an Hb level below 8 g/dl is significantly associated with an increase in the risk of PPH. It is also associated with significantly increasing the severity of PPH.

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هل فقر الدم عامل خطر لنزيف ما بعد الولادة؟

الخلفية: لا يزال نزيف ما بعد الولادة (PPH) يمثل مشكلة خطيرة للنساء الحوامل في جميع أنحاء العالم. يعد فقر الدم أحد أكثر حالات نقص التغذية شيوعًا التي تصيب النساء الحوامل. تم ربط فقر الدم بزيادة حدوث نزيف ما بعد الولادة. هدفت الدراسة إلى تقييم العلاقة بين نزيف ما بعد الولادة وفقر الدم، وخاصة لتحديد ما إذا كان فقر الدم هو عامل خطر لنزيف ما بعد الولادة أم لا.

المواضيع والطرق: أجريت دراسة الحالات والشواهد هذه في مستشفى البصرة للأمومة والأطفال في البصرة، العراق، خلال الفترة من ١ يناير ٢٠٢٣ إلى ١ سبتمبر ٢٠٢٣. خضعت كل امرأة مشمولة للتاريخ الطبي الكامل والفحص. ومستوى Hb لتحديد مستوى فقر الدم.

النتائج: شملت الدراسة ١٢٥ امرأة، منهن ٨١ امرأة حامل مصابات بفقر الدم وتطورن نزيف ما بعد الولادة و٤٤ امرأة حامل مصابات بفقر الدم ولكن لم يصبن بنزف ما بعد الولادة بعد الولادة المهبلية الطبيعية. وقد ظهر النزف التالي للوضع في ٦٤,٨٪ من السيدات الحوامل، وكان خفيفاً في ٦٥,٤٪ من الحالات وشديداً في ٣٤,٦٪ منهن. يرتبط التعداد، وارتفاع عمر الحمل، ونقص الرعاية السابقة للولادة (ANC) بارتفاع معدل انتشار النزف التالي للوضع، لكن هذا الارتباط لم يكن مهمًا مع التكافؤ وعمر الحمل وكان مهمًا فقط مع $(P < 0.05)$. يرتبط فقر الدم الشديد مع مستويات Hb أقل من ٨ جم / ديسيلتر بشكل كبير بتطور النزف التالي للوضع ($P < 0.05$)، كما يرتبط فقر الدم الوخيم أيضًا بشكل كبير بحدوث النزف التالي للوضع الشديد ($P < 0.01$). **الاستنتاج:** فقر الدم الوخيم مع مستوى خضاب الدم أقل من ٨ جم/ديسيلتر يرتبط بشكل كبير بزيادة خطر الإصابة بالنزف التالي للوضع. ويرتبط أيضًا بزيادة كبيرة في شدة النزف التالي للوضع.

الكلمات المفتاحية: فقر الدم، ما بعد الولادة، النزيف، البصرة