International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Viswanathan M et al. Int J Reprod Contracept Obstet Gynecol. 2025 May;14(5):1511-1515
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20251233

Original Research Article

The mean postpartum drop in the hemoglobin levels in a patient after delivery in the population attending a tertiary hospital in south Kerala

Manjusha Viswanathan[1]*, Suja Daniel[1], Nimmy P.[1], Manju L.[2]

[1]Department of Obstetrics and Gynecology, Sree Gokulam Medical College and Research Foundation, Trivandrum, Kerala, India
[2]Department of Statistics, Sree Gokulam Medical College and Research Foundation, Trivandrum, Kerala, India

Received: 04 March 2025
Revised: 08 April 2025
Accepted: 09 April 2025

***Correspondence:**
Dr. Manjusha Viswanathan,
E-mail: manjuvishy94@gmail.com

ABSTRACT

Background: Post partum hemorrhage is still the major cause of maternal mortality and morbidity all around the world. Post partum anemia is a major outcome of postpartum hemorrhage and this affects the maternal health. Postpartum anemia is diagnosed when the adjusted Hb falls to <11 gm% in 24 hours, this impacts 80% of women in low- and middle-income countries. We hypothesize that more than anemia and blood loss it is the percentage drop in hemoglobin postnatally that affects the maternal health.
Methods: The prospective observational study for a period of 1 year from January 2018 among the antenatal patients attending Sree Gokulam Medical College and Research Foundation, Kerala. 544 women were included in the study after applying the inclusion and exclusion criteria. The hemoglobin levels were estimated at the time of admission for labor and 48 hours postnatally. Statistical analysis was done and the mean hemoglobin drop post-partum was calculated in cases of normal delivery and in Caesarean section.
Results: There is a mean drop of Hb of 0.237 (95% CI 0.091-0.383) with t value of 3.189 (p- value of 0.002) and the mean fall in Hb after CS is 0.604 with t value of 5.847 (95% CI 0.400-0.808) with percentage drop in Hb calculated as 5.09%.
Conclusions: There is significant blood-loss not amounting to postpartum hemorrhage by definition but can affect the maternal health detrimentally.

Keywords: Hemoglobin, Postpartum hemorrhage, Post postpartum anemia

INTRODUCTION

Anemia is public health problem worldwide, more so among women of reproductive age. The major cause of anemia is found to be due to iron deficiency. Pregnancy, parturition and lactation also adds to the insult on the already iron deficient women of reproductive age group. Consequences of anemia resulting from iron deficiency during the postpartum period (up to six weeks after child birth) can be serious and have long-term health implications for the mother and her child. Post partum anemia is diagnosed when Hb is <110 g/L at 1 week postpartum and <120 g/L at 8 weeks postpartum.[1]

Currently there is no single effective tool to calculate the blood loss during delivery which is one major causative factor for post-partum blood loss. Hence postpartum hemorrhage, anemia and blood loss are under-diagnosed which leads to morbidity for the postnatal woman and to her new born. Anemia in antenatal period has been studied extensively by various authors but emphasis needs to be given to postpartum anemia too so as to decrease the

morbidity of both the mother and the neonate. The burden of maternal and neonatal morbidity is a major health concern for the low-, lower- and middle-income countries with high population. In our study we aim to estimate the mean percentage drop of Hb 48 hours after delivery which will help to diagnose the cases of post-partum blood loss not amounting to PPH accurately.

METHODS

It was a prospective observational study conducted over 12 months from 01st January 2018 to 31st December 2018 in Sree Gokulam Medical college and Reasearch foundation Venjaramoodu Trivandrum Kerala. Patients delivering in SGMCRF during the study period meeting the inclusion and exclusion criteria were included in the study, which came up-to 544 patients.

Inclusion criteria

All patients delivering in the hospital with singleton pregnancies.

Exclusion criteria

Patients with anemia in the antenatal period, patients with hematological and bleeding disorders and patients on anti-coagulant medications were excluded.

Patient data was collected using a questionnaire. The hemoglobin levels were estimated at the time of admission for labor by doing automated Hb analysis. Blood was collected in prefilled EDTA containers. The labor events were documented and active management of third stage of labor was practiced uniformly. The visual estimate of blood loss is documented by the standard. Post-partum hemoglobin value is estimated 48 hours after delivery by the same method as the previous one. All the data was tabulated and statistical analysis done. The mean hemoglobin drop post-partum is calculated in cases of normal delivery and in caesarean section separately

Anemia is defined as Hb levels of <11gm/dl in pregnant women.[2]

Post-partum hemorrhage (PPH) is defined as blood loss greater than or equal to 500 ml within 24 hours after birth, or blood loss accompanied by signs or symptoms of hypovolemia within 24 hours.[3-5]

Active management of third stage: The FIGO–ICM definition includes use of a uterotonic (oxytocin 5 units diluted in 5 ml distilled water as IV bolus and IVF with 15 units of oxytocin at 60 drops/min) immediately following delivery of the fetus, controlled cord traction and fundal massage immediately after delivery of the placenta, followed by palpation of the uterus every 15 minutes for 2 hours to assess the continued need for massage.[6,7]

Post partum anemia (PPA): Adjusted Hb levels of postnatal women below 11 gm/dl within 24 h and 12gm/dl up to 6 weeks after the birth period result in postpartum anemia, which is further classified as mild (adj Hb = 11-11.9 gm/dl), moderate (adj Hb = 8-10.9gm/dl) and severe (adj Hb <8 gm/dl).[8]

Statistical analysis

Data analysis was done using SPSS software version 20. Qualitative variables were expressed in frequency and percentage whereas the quantitative variables were expressed in mean and standard deviation (SD). Paired t test was used to test the significance of the fall in Hb after delivery. P value <0.05 is considered as significant.

RESULTS

In our study majority of the patients were in the age group of 23 to 27 years (n=222;40.8%) (Figure 1).

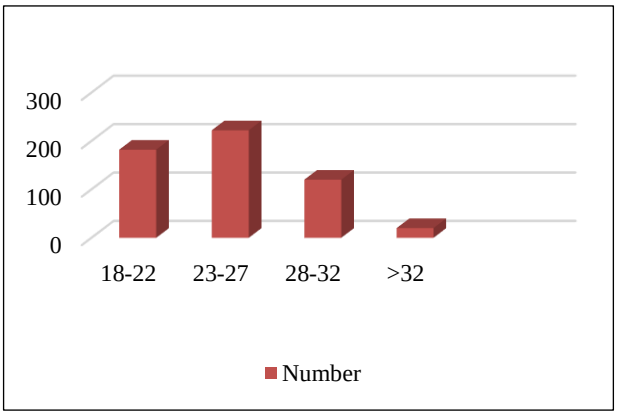

Figure 1: Age distribution among antenatal patients.

Mode of delivery

There were 372 patients who underwent normal delivery (n=372 68.4%) and 170 had caesarean section (n=170, 31.3%). The caesarean sections included elective emergency primary and repeat caesarean sections) (Figure 2).

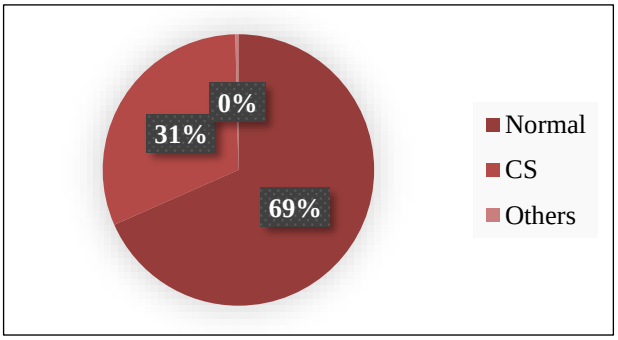

Figure 2: Mode of delivery.

Bleeding at delivery

Out of 544 patients, 529 had bleeding with in normal limits according to the visual assessment and 15 had bleeding exceeding 500 ml in 24 hours (Table 1).

Table 1: Bleeding during delivery.

Variable	Number	Percentage
Post partum hemorrhage	15	2.7
Normal bleeding	529	97.2
Total	544	100

In Table 2 we compare the fall in Hb values among patients with normal delivery with no excessive blood loss by visual method we can see that there is a mean drop of Hb of 0.237 (CI 0.091-0.383) with T value of 3.189 and p value of .002 which is significant.

There is a 1.94% drop of Hb in normal labor. When we make similar assessment in patients who underwent CS with normal bleeding by visual inspection, the mean fall in Hb after cs is 0.604 with t value of 5.847 (CI 0.400-0.808 with mean Hb drop calculated at 5.09%.

Table 2: Fall in Hb values among patients.

Mode of delivery	Mean	SD	Mean difference 95% CI	t value	P value
Vaginal (n=364)					
Prenatal Hb	11.991	1.036	0.237 (0.091-0.383)	3.189	0.002
Post-natal Hb	11.754	1.476			
CS (n=170)					
Prenatal Hb	11.881	1.007	0.604 (0.400-0.808)	5.847	<0.0001
Post-natal Hb	11.277	1.240			

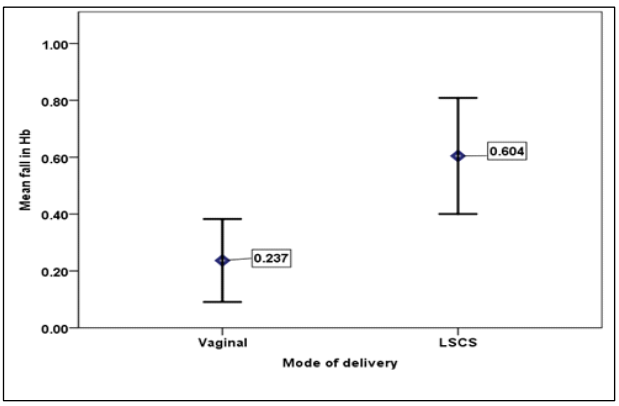

Figure 3: The range of fall of Hb.

DISCUSSION

Pregnancy is associated with physiological changes that involve almost all organ systems of the body. Many of the physiological hematological changes may appear to be pathological in the non-pregnant state. Physiological changes in pregnancy and puerperium are principally influenced by changes in the hormonal milieu.

During pregnancy, the total blood volume increases by about 1.5 liters, mainly to supply the demands of the new vascular bed and to compensate for blood loss occurring at delivery.[9] Around one liter of blood is contained within the uterus and maternal blood spaces of the placenta. The elevation in plasma volume is in response to an under filled vascular system resulting from systemic vasodilatation and increase in vascular capacitance.

Red cell mass (driven by an increase in maternal erythropoietin production) also increases, but relatively less, compared with the increase in plasma volume, the net result being a dip in hemoglobin concentration. Thus, there is dilutional anemia. The drop in hemoglobin is typically by 1-2 g/dl by the late second trimester and stabilizes thereafter in the third trimester, when there is a reduction in maternal plasma volume (owing to an increase in levels of atrial natriuretic peptide). Women who take iron supplements have less pronounced changes in hemoglobin, as they increase their red cell mass in a more proportionate.[9]

Post pregnancy, plasma volume decreases as a result of diuresis, and the blood volume returns to non-pregnant values. Hemoglobin and hematocrit increase consequently. Plasma volume increases again two to five days later, possibly because of a rise in aldosterone secretion.[10]

The review of literature does not throw light on the rate of fall of hematocrit/hemoglobin values after delivery which will help us to determine the need for supplementation and treatment.

Postpartum anemia (PPA) is a public health problem that affects low-, middle- and high-income countries, and has significant adverse consequences, on the health, social and economic development. Maternal anemia is associated with increased risk of maternal and perinatal mortality, irrespective of confounding factors.[11] PPA is a major cause of morbidity in women and is under diagnosed and left untreated.[12] PPA if left untreated can lead to maternal depression, fatigue and decreased breast-feeding initiation

which affects the neonatal health too. Hence it is important to assess the Hb fall to diagnose the PPA which can occur even in absence of overt post-partum hemorrhage. It is important to assess the hb drop irrespective of prenatal hb values to diagnose PPA. Even if there is normal Hb value, a drop of more than 1.94% as obtained from our study after normal delivery and of 5.09% fall after LSCS from antenatal Hb level can produce symptoms for the mother in the postpartum period. studies are abundant on antenatal anemia and its effect on maternal and neonatal outcome but studies are scare on the post-partum anemia and its health impact on mother and the baby.

In a study by Enaf et al on fall of Hb after normal delivery with and without PPH has concluded that there was a fall of Hb of 0.9 ±1 gm% in patients with normal bleeding after delivery.[13] In a study by Miller et al the mean predelivery and post-partum Hb levels were 12.3 (1.2) g/dl and 10.8 (1.08) g/dl, respectively.[14] Here there is a fall of 1.5 gm /dl. In our study there was a mean fall of 0.237 which is less than that of both the studies. This might be explained by the better control of postpartum bleeding due to institutional deliveries conducted by trained professionals and the uniform practice of active management of third stage of labor in all cases. The study by Enaf et al included patients with PPH also and our study excluded the patients who had PPH. This might also have contributed to the difference in the fall of Hb.

Following childbirth, anemia is associated with fatigue and increased risk of postnatal depression, both of which have been shown to improve following iron supplementation. The risk of sepsis and poor wound healing is also increased with post-partum anemia. A study by Xu et al states that depression is associated with anemia in women before and after birth. The finding highlights the need for treating anemia which may help to prevent postnatal depression. This study thus provides a link between postpartum anemia and post-partum depression.[15] Another study states that PPA is associated with several health consequences, including palpitations, dizziness, and breathlessness, and increases the risk of infections. Postpartum anemia is also seen to affect maternal mood, cognition, and behavior resulting in reduced physical and mental performance, including postpartum fatigue and depression and reduced duration of breast feeding. All these impair health-related quality of life and negatively affect the wellbeing of both the mother and child thus significantly interferes with mother-child interactions.[8]

Post partum hemorrhage and post-partum anemia as understood from current literature can cause maternal neonatal morbidity and mortality. More studies are required to assess the maternal and neonatal outcome of significant bleeding during labor not amounting to PPH or diagnosed PPA. There was no limitation for this study.

CONCLUSION

Post partum falls of hemoglobin of more than 1.9% in normal labor and 5.09% in LSCS from the antenatal Hb value has to be considered as significant blood loss not amounting to postpartum hemorrhage. Further studies need to be conducted to assess the maternal and neonatal outcome in patients with Hb fall of >1.9% in normal labor and 5.09% in LSCS to understand the maternal and neonatal outcome in excessive blood loss not amounting to post-partum hemorrhage.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Milman N. Postpartum anemia I: definition, prevalence, causes, and consequences. Ann Hematol. 2011;90(11):1247-53.
2. World Health Organization. Anaemia. Available at: https://www.who.int/data/nutrition/nlis/info/anaemia. Accessed 01 December 2024.
3. World Health Organization. WHO guidelines for the management of postpartum haemorrhage and retained placenta, 2009. Available at: http://www.ncbi.nlm.nih.gov/books/NBK148662/. Accessed 01 December 2024.
4. Royal College of Obstetricians and Gynaecologists. Prevention and management of postpartum haemorrhage (Green-top Guideline No. 52). Available at: https://www.rcog.org.uk/guidance/browse-all-guidance/green-top-guidelines/prevention-and-management-of-postpartum-haemorrhage-green-top-guideline-no-52/. Accessed 01 December 2024.
5. American College of Obstetricians and Gynecologists. Postpartum hemorrhage. Available at: https://www.acog.org/clinical/clinical-guidance/practice-bulletin/articles/2017/10/postpartum-hemorrhage. Accessed 01 December 2024.
6. World Health Organization. Use of active management of the third stage of labour in seven developing countries. Available at: http://www.who.int/bulletin/volumes/87/3/08-052597/en/. Accessed 01 December 2024.
7. Gülmezoglu AM, Lumbiganon P, Landoulsi S, Widmer M, Abdel-Aleem H, Festin M, et al. Active management of the third stage of labour with and without controlled cord traction: a randomised, controlled, non-inferiority trial. Lancet. 2012;379(9827):1721-7.
8. Susič D, Bombač Tavčar L, Lučovnik M, Hrobat H, Gornik L, Gradišek A. Wellbeing forecasting in postpartum anemia patients. Healthcare (Basel). 2023;11(12):1694.
9. Chandra S, Tripathi AK, Mishra S, Amzarul M, Vaish AK. Physiological changes in hematological

parameters during pregnancy. Indian J Hematol Blood Transfus. 2012;28(3):144-6.
10. Institute of Medicine (US) Committee on Nutritional Status During Pregnancy and Lactation. Iron nutrition during pregnancy. Washington (DC): National Academies Press (US); 1990.
11. The Royal College of Pathologists. Anaemia in pregnancy and the postpartum period. Available at: https://www.rcpath.org/profession/publications/college-bulletin/july-2021/anaemia-in-pregnancy-and-the-postpartum-period.html. Accessed 01 December 2024.
12. Bergmann RL, Richter R, Bergmann KE, Dudenhausen JW. Prevalence and risk factors for early postpartum anemia. Eur J Obstet Gynecol Reprod Biol. 2010;150(2):126-31.
13. Yefet E, Yossef A, Suleiman A, Hatokay A, Nachum Z. Hemoglobin drop following postpartum hemorrhage. Sci Rep. 2020;10:21685.
14. Miller CM, Ramachandran B, Akbar K, Carvalho B, Butwick AJ. The impact of postpartum hemoglobin levels on maternal quality of life after delivery: a prospective exploratory study. Ann Hematol. 2016;95(12):2049-55.
15. Xu F, Roberts L, Binns C, Sullivan E, Homer CSE. Anaemia and depression before and after birth: a cohort study based on linked population data. BMC Psychiatry. 2018;18(1):224.

Cite this article as: Viswanathan M, Daniel S, Nimmy P, Manju L. The mean postpartum drop in the hemoglobin levels in a patient after delivery in the population attending a tertiary hospital in south Kerala. Int J Reprod Contracept Obstet Gynecol 2025;14:1511-5.