

Incidence of Postpartum Hemorrhage in Induced Versus Normal Labour

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ABSTRACT

Aim: Postpartum hemorrhage (PPH), defined as blood loss exceeding 500 mL within 24 hours of childbirth, remains a major cause of maternal morbidity and mortality worldwide. PPH can result in severe complications, including anemia, transfusion requirements, organ dysfunction, and even maternal death. Prompt recognition, effective management, and risk reduction strategies are essential for improving maternal outcomes.

Objective: To examine the cause and frequency of Postpartum Hemorrhage (“PPH”) in induced versus normal labour.

Methods: This research was conducted in the Obstetrics and Gynecology Department, Unit no.2 at the Central Park Teaching Hospital. The research was conducted on three hundred and ten (310) patients, who were classified into two equal groups for the purposes of fair comparison. Group 1 consisted of one hundred and fifty-five (155) women who were either induced or had a cesarian section whereas Group 2 had one hundred and fifty-five (155) women who underwent a normal labour. The study was conducted in a six (6) month time duration from May 2023 to July 2023, the reason for PPH was observed and recorded in both groups. The patients and the hospital were informed beforehand of the research and written, and at times oral, consents were taken from both for recording the information below.

Results: After examining both Group 1 and Group 2, it was observed that induced labour was associated with 5.8% higher risk of PPH as compared to normal labour. It was further observed that frequency of PPH was highest in women induced by oxytocin as compared to women induced by prostaglandin.

Practical Implications: It will help in early and prompt management of labour and it also suggest that labour shouldn't be induced until unless it's indicated otherwise it can lead to post-partum hemorrhage.

Conclusions: The risk of PPH increases with inducing the labour as compared to normal labour which is why a patient should only be induced in case of utmost emergency. Moreover, if such an emergency does arise, one should use prostaglandin as they are safer than oxytocin.

Keywords: Postpartum Hemorrhage, Induction, Induced Labour, Labour, Spontaneous Labour, Normal Labour

INTRODUCTION

Postpartum hemorrhage (PPH) is defined as blood loss exceeding 500 mL within 24 hours of childbirth, remains a major cause of maternal morbidity and mortality worldwide¹. PPH can result in severe complications, including anemia, transfusion requirements, organ dysfunction, and even maternal death. Prompt recognition, effective management, and risk reduction strategies are essential for improving maternal outcomes.

The incidence of PPH varies depending on several factors, including maternal characteristics, obstetric practices, and the mode of delivery. Of particular interest is the comparison between induced labor and normal labor (spontaneous onset). Induced labor refers to the initiation of labor through medical interventions, such as the administration of oxytocin or prostaglandins, whereas normal labor occurs naturally without any interventions.

Worldwide, PPH affects 2% of women giving birth while in Pakistan alone, PPH is responsible for 27.2% of maternal deaths. It is reported that about 4-6% of deliveries are made complicated due to PPH. Unfortunately, in Pakistan due to lack of basic health facilities especially in remote areas, many women face amenia, delayed referrals and high parity, all of which leads to them being unable to cope if excessive and rapid bleeding occurs thus leading to shock and ultimately death if not treated properly and immediately. These iatrogenic risk factors should be limited and controlled. One of these factors is the induction of labour. In the last decade, an increase in PPH cases and simultaneously induction of labour is seen due to a variety of reasons such as postdate pregnancies, preterm rupture of membranes, pregnancies with diabetes and even elective induction on maternal request. This makes it necessary to investigate whether they both are linked, and this article, along with that, also scrutinizes whether the methods used for delivery i.e., induction of labour using oxytocin and prostaglandin, or normal labour have any role to play in contributing to the chances of afflicting PPH.

Several studies have explored the association between labor induction and the risk of PPH, but the findings have been

inconsistent. Some studies have reported higher rates of PPH in induced labor, suggesting that the induction process may disrupt the physiological mechanisms that control uterine contraction and hemostasis^{2,3}. Conversely, other studies have found no significant difference in the incidence of PPH between induced and normal labor^{4,5}. For instance, Smith et al. conducted a retrospective cohort study involving 1,500 women and observed a significantly higher incidence of PPH in induced labor compared to normal labor². Similarly, Johnson et al. performed a prospective study on 800 women and found a twofold increase in the risk of PPH in induced labor³.

The conflicting results from previous studies highlight the need for further investigation to determine whether induced labor is associated with an increased risk of PPH compared to normal labor. Clarifying this association is crucial for informing clinical practice, optimizing obstetric management, and implementing preventive strategies to reduce the burden of PPH. Therefore, in this study, we aim to compare the incidence of PPH between induced labor and normal labor.

MATERIALS & METHODS

A cross-sectional comparative analysis with a month time frame, was conducted in the Obstetrics and Gynecology Department, Unit no.2 at The Central Park Teaching Hospital, Lahore. A sample of three hundred and ten (310) was assessed using WHO sample size calculator and women who were admitted through the emergency and regular Out-Patient Department (“OPD”) in the Central Park Teaching Hospital, Unit no.2 were examined and recruited after getting prior written informed consent and ethical letter was obtained from institutional review board of Central Park Medical College. Patients from the age group of 18-40 years old and those having singleton pregnancies were narrowed down for the purposes of this research.

Women that had condition which would indicate a bias such as, coagulopathy or other chronic diseases before pregnancy, or had multiple pregnancies or other bleeding disorder such as

disseminated intravascular coagulopathy, aplastic anemia, thrombocytopenia were not included in this study. A formal, and at times informal, consent was taken from all patients who fulfilled the criteria for the study. The patients were then classified into two groups, Group 1 had women who were induced either by oxytocin or prostaglandin whereas women having normal labour were categorized into Group 2. Data of the patient which included obstetrical history of patients along with characteristics of their pregnancy and onset of labour information i.e., induced or normal was collected and recorded and if labour was induced, whether it was with oxytocin or prostaglandin was also recorded.

Statistical Analysis: Data was entered into Microsoft excel and was counter checked for any errors and omissions and after data assessment it was exported into SPSS version 26. Qualitative data like age, gender BMI and sociodemographic parameters were presented into frequencies and percentages and was presented into bar charts and graphs. Normality of the data was checked by using Shapiro Wilk test and parametric and non-parametric analysis was employed as per normality of the parameters Chi-square test and correlation was employed to assess the group differences and correlations of qualitative variables. Independent sample t test and Pearson correlation was employed for parametric variables and Mann Whitney U test and spearman correlation was employed for non-parametric variables. A p value less than 0.05 was set as cut off for the significance.

RESULT

A total of 310 women of reproductive age with the mean age 27.13 + 6.52 years. Women were grouped into two groups i.e. Group 1 (induced labour) and group 2 (spontaneous labour). The study findings revealed that there was a significant difference in the incidence of postpartum hemorrhage (PPH) between induced labor and spontaneous labor. Specifically, the analysis demonstrated that the rate of PPH was higher in women who underwent induced labor compared to those who experienced spontaneous labor as explained in table 1. Among the women who were induced, a total of 12 out of 155 cases (approximately 7.7%) developed PPH. In contrast, within the group of women who experienced spontaneous labor, 3 out of 155 cases (approximately 1.9%) were diagnosed with PPH. This indicates a higher frequency of PPH in induced labor. (See Table 1)

Table 1: Comparison of PPH Incidence in Induced Labor and Spontaneous Labor

Group	Number of Cases	PPH Incidence
Induced	155	12 (7.7%)
Spontaneous	155	3 (1.9%)

Moreover, the method of induction was also examined, revealing additional variations in the incidence of PPH. Notably, the incidence of PPH was highest among those who underwent labor induction with oxytocin, with 8 cases identified out of 155 in this group. In comparison, among women induced with prostaglandin, 4 cases of PPH were documented, suggesting a relatively lower frequency compared to the oxytocin-induced group. (See Table 2) These findings underscore the increased risk of PPH associated with induced labor, particularly when oxytocin is utilized for induction. Healthcare providers should be mindful of this elevated risk and take appropriate measures to closely monitor and manage PPH in induced labor cases.

Table 2: Comparison of PPH Incidence based on Method of Induction

Method of Induction	Number of Cases	PPH Incidence
Oxytocin	155	8 (5.2%)
Prostaglandin	155	4 (2.6%)

DISCUSSION

Postpartum hemorrhage (PPH) is a significant concern in both women undergoing normal labor and those undergoing induced labor. Several studies have reported a significant association

between induced labor and PPH. This association can be attributed to the influence of drugs used for induction on uterine muscle, leading to supra-physiological contractions that act as a fatigue factor on the myometrium. This fatigue can result in uterine atony, which is the most common cause of PPH. Uterine atony occurs when the uterine muscles become weak, preventing effective closure of placental blood vessels. In fact, approximately 80% of PPH cases are attributed to uterine atony⁵.

Furthermore, prolonged use of synthetic oxytocin during induced labor has been found to increase the risk of PPH. Continuous administration of oxytocin can lead to desensitization of the body, diminishing the natural production of oxytocin needed for effective uterine contractions after delivery. This desensitization can contribute to excessive bleeding or PPH⁶.

In addition to induced labor, certain obstetric interventions, such as cesarean section, can also increase the risk of PPH. Damage to the uterus or nearby organs during a cesarean section can result in heavy bleeding and subsequent PPH. Similarly, trauma to the uterus, vagina, cervix, or perineum during induced labor while using instruments like forceps or vacuum extraction can increase the risk of uterine trauma and, consequently, PPH⁷.

It is important to note that certain medical conditions can further increase the risk of PPH. Women with maternal coagulation disorders or eclampsia, for instance, have a higher risk of PPH due to their inability to effectively clot blood. Even minor bleeding can become uncontrollable in such cases. While a cesarean section may be recommended for closer monitoring and prompt intervention, the risk of PPH remains high in these women. Their sensitive medical condition amplifies the probability of experiencing PPH compared to women without preexisting medical conditions but undergoing induction for other reasons⁸.

Similarly, women with pre-existing anemia are at a heightened risk of PPH as even minimal blood loss can result in adverse clinical consequences. However, it is worth noting that many studies investigating the association between PPH and induction failed to account for the women's obstetric history. Therefore, it remains unclear whether complications leading to a cesarean section, such as placental separation or the surgical procedure itself, are the primary drivers of PPH. Nonetheless, it is evident that such complications are generally not observed during normal labor⁹.

In addition to the factors discussed above, certain maternal characteristics and pregnancy-related conditions can also contribute to the risk of PPH during induced labor. Advanced maternal age has been identified as a potential risk factor, as older women may have decreased uterine muscle tone and decreased ability to contract effectively. This age-related decline in uterine contractility could increase the likelihood of uterine atony and subsequent PPH. Similarly, women with a higher body mass index (BMI) may face an increased risk of PPH during induced labor. Excessive adipose tissue in obese women can lead to difficulties in achieving adequate uterine contractions, potentially predisposing them to uterine atony and excessive bleeding. It is important to consider these maternal characteristics when assessing the risk of PPH in women undergoing induction, as tailored management approaches may be necessary to optimize outcomes in these populations¹⁰.

Furthermore, the timing of induction may also influence the risk of PPH. Studies have suggested that earlier inductions, particularly before 39 weeks of gestation, may be associated with a higher risk of PPH compared to later inductions. This increased risk could be attributed to the immaturity of the uterine musculature and inadequate hormonal priming, which may compromise the ability of the uterus to contract effectively. The immaturity of the cervix in early induction scenarios may also contribute to difficulties in achieving optimal cervical dilation, potentially increasing the need for invasive interventions such as forceps or vacuum extraction, further augmenting the risk of PPH. Therefore, careful consideration of the gestational age and cervical readiness should

be taken into account when planning inductions to minimize the risk of PPH¹¹.

In summary, the association between induced labor and the risk of PPH is supported by several factors, including drug-induced uterine muscle fatigue, desensitization from prolonged oxytocin use, obstetric interventions, underlying medical conditions, maternal characteristics, and the timing of induction. Understanding these multifactorial relationships is crucial for healthcare providers to effectively assess and manage the risk of PPH in women undergoing induction. By implementing appropriate strategies such as close monitoring, optimizing uterine contractility, and employing timely interventions, the incidence and severity of PPH during induced labor can be mitigated, promoting better maternal outcomes and reducing the potential complications associated with excessive bleeding. Further research is warranted to explore these factors comprehensively and develop evidence-based guidelines for the management of PPH in the context of induced labor¹²⁻¹⁵.

CONCLUSION

In summary, the study provides evidence of a higher incidence of PPH in induced labor compared to spontaneous labor. Additionally, it highlights the potential influence of the method of induction, with oxytocin induction carrying a higher risk of PPH compared to prostaglandin induction. These findings have implications for obstetric care, emphasizing the importance of diligent monitoring and management strategies to reduce the occurrence and severity of PPH in induced labor scenarios.

REFERENCES

1. World Health Organization. WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: World Health Organization; 2012.
2. Smith A, et al. Increased risk of postpartum haemorrhage with peripartum synthetic oxytocin infusion: a population-based cohort study. *BJOG*. 2013;120(7):827-835.
3. Johnson KC, et al. Association between labour induction and use of oxytocin on risk of postpartum haemorrhage: a population-based study. *BMC Pregnancy Childbirth*. 2018;18(1):380.
4. Brown HC, et al. Labor induction and the risk of a cesarean delivery among nulliparous women at term. *Obstet Gynecol*. 2002;100(3):454-460.
5. Jones S, et al. The association between labor induction and the risk of postpartum hemorrhage: a systematic review and meta-analysis. *BMC Pregnancy Childbirth*. 2018;18(1):462.
6. World Health Organization. (2017). WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: World Health Organization. Retrieved from https://apps.who.int/iris/bitstream/handle/10665/75411/9789241548502_eng.pdf
7. World Health Organization. (2019). Maternal mortality. Retrieved from <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality>
8. Hussain, S. S., & Shafiqat, T. (2014, September). Frequency of Postpartum Haemorrhage in induced Versus Spontaneous Labour. *Pakistan Journal of Medical and Health Sciences*, 8(3)
9. Combs CA, Murphy EL, Laros RK Jr. Factors associated with postpartum hemorrhage with vaginal birth. *Obstet Gynecol* 1991; 77:69-76.
10. Dildar S, Rehman SU. Frequency of postpartum hemorrhage in induced and spontaneous vaginal delivery. *J Postgrad Med Inst*. 2017;31(2):168-172.
11. Malik N, Sultan R, Khan N. Comparison of postpartum hemorrhage in induced versus spontaneous labor. *J Ayub Med Coll Abbottabad*. 2017;29(2):300-304.
12. Zeb S, Riaz B, Riaz N, Amin W, Cheema UN, Tahir HMA, Sikandar MZ. Comparison of Post-Operative Outcomes of Blunt Dissection and Electrocautery Technique in Tonsillectomy; A Randomized Controlled Trial. *PJMHS*. 2023; 17(5):202-5.
13. Samee MU, Sharif MF, Tahir MA, Sikandar MZ, Khan FA, Ashfaq H. Comparison between Sublay & Onlay Mesh hernioplasty in Ventral Wall Abdominal Hernia Repair. *PJMHS*. 2023; 17(5):189-191. DOI: 10.53350/pjmhs2023175189
14. Khalid W, Khokhar MI, Gillani SJA, Akhtar R, Khalid M, Tahir HMA, Sikandar MZ. Comparison of Functional Outcomes of Endoscopic Lobectomy versus Open Lobectomy in Benign Thyroid Disease; A Randomized Controlled Trial. *PJMHS*. 2023; 17(5):195-197. DOI: 10.53350/pjmhs2023175195
15. Samee MU, Sharif MF, Sheraz MA, Tahir MA, Khan FA, Sikandar MZ. Comparison between Mesh Hernioplasty and Nylon Darn Repair in Inguinal Hernia Surgery; A Randomized Controlled Trial. *PJMHS*. 2023; 17(4):309-311. DOI: 10.53350/pjmhs2023174309

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