ISSN: 2581 – 3633

International Journal of Medical Science and Advanced Clinical Research (IJMACR)

Available Online at: *https://www.ijmacr.com*

Volume – 9, Issue – 5, September – 2026, Page No.: 578 – 583

A Comparative Study of Blood Loss in Spontaneous and Induced Vaginal Delivery in Primigravida in the department of Obstetrics and Gynaecology, SMS Medical College, Jaipur.

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How to citation this article: Dr. Geetika Madhwani, Dr. Divij Goel, Dr. Dheeraj Runthala, "A Comparative Study of Blood Loss in Spontaneous and Induced Vaginal Delivery in Primigravida in the department of Obstetrics and Gynaecology, SMS Medical College, Jaipur", IJMACR– September– 2026, Volume – 9, Issue – 5, P. No. 578 – 583.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Background: Primary postpartum haemorrhage (PPH) is defined as blood loss of 500 ml or more in the first 24 hours. Induction of labor may increase the risk of PPH by uterine atony. In spontaneous labor, the cervix naturally undergoes favourable changes, leading to better cervical readiness for delivery. So compare the Blood Loss in Spontaneous and Induced Vaginal Delivery in Primigravida is significant.

Methods: A total of 200 patients were included and distributed in Group A & B (100 in each group). Blood loss during the third stage of labor was measured using a calibrated blood collection bag. Clinical parameters were monitored at admission and then postpartum every 30 minutes for the first hour, followed by assessments at 12-hour intervals.

Results: Mean age was slightly higher in the induction group (25.2 ± 4.23 years) compared to the spontaneous group (24.7 ± 3.93 years).

The mean blood loss in the induction group was higher (335.4 ± 158.97 ml) compared to the spontaneous group (266.2 ± 212.80 ml). This difference was statistically significant, with a p-value of 0.009. In the induction group, 10 women (10%) required a blood transfusion after delivery, compared to only 3 women (3%) in the spontaneous group.

Conclusion: Women who underwent induction experienced greater blood loss and were more likely to require post-delivery blood transfusion, indicating an elevated risk of postpartum hemorrhage in this group.

Keywords: Induction, Prostaglandins, PPH, Blood Loss

Introduction

Primary postpartum haemorrhage (PPH) is defined as blood loss of 500 ml or more in the first 24 hours following vaginal delivery of the baby.[1] PPH affects approximately 2% of all women giving birth and remains a leading cause of maternal morbidity and mortality. Maternal death due to PPH occurs in 1/1000 deliveries in developing countries and in 1/100000 deliveries in high income countries such as the U.K.[2] All women carrying pregnancy beyond 20 weeks of gestation are at risk of developing PPH. Secondary PPH occurs after 24 hours up to 6 weeks after childbirth. It is a significant obstetric complication that requires prompt recognition and management to prevent adverse outcomes. The mode of labor onset, specifically induction of labor versus spontaneous labor, has been a subject of interest and debate regarding its association with PPH.[3]

Several risk factors have been identified as causative of postpartum haemorrhage, for example; Asian race, anaemia, hypertensive disorders, prior PPH, history of retained placenta, multiple pregnancies, ante partum haemorrhage, macrosomia (> 4 kg), chorioamnionitis, uterine over distension, epidural anaesthesia, prolonged first/second stage of labour, induction labour, etc.[4] The induction of labour is a common practice in every labour room. This intervention is frequently employed for various indications, such as post-term pregnancy, fetal distress, and maternal medical conditions. Pharmacological forms of IOL include synthetic prostaglandins and synthetic oxytocin. Misoprostol, prostaglandin E1 (PGE1), and dinoprostone, prostaglandin E2 (PGE2), are used in various doses and routes of administration.[5] One potential mechanism by which induction of labor may increase the risk of PPH is uterine atony, which refers to the failure of the uterus to contract adequately after childbirth. In induced labor, the cervix may be less favourable for delivery, requiring additional interventions such as cervical ripening or membrane sweeping, which can potentially increase the risk of trauma to the birth canal. On the other hand, in spontaneous labor, the cervix naturally undergoes favourable changes, leading to better cervical readiness for delivery and potentially reducing the risk of genital tract trauma.[6] The study aims to compare the Blood Loss in Spontaneous and Induced Vaginal Delivery in Primigravida.

Material and Methods

It was a Prospective Observational study conducted at SMS Medical College, Jaipur between the period October 2023 to September 2024. A total of 200 patients were included and allocated into two groups as follows:

Group A: One hundred cases with full-term singleton pregnancies >37 weeks undergoing Spontaneous vaginal delivery were selected.

Group B: One hundred cases > 37 weeks of singleton pregnancies undergoing induced vaginal delivery were selected.

Exclusion Criteria

Patient with Placenta previa, known coagulation disorders, Hypertensive disorders, Liver disease were excluded from study.

A detailed history was taken from each participant, followed by a general physical examination. Risk factors such as preeclampsia, gestational hypertension, gestational diabetes mellitus, and any prior history of postpartum hemorrhage were documented. Written informed consent was obtained prior to labor induction.

The induction protocol included administration of intra cervical Dinoprostone gel.

Blood loss during the third stage of labor was measured using a calibrated blood collection bag. This device consisted of a funnel-shaped, calibrated pouch attached to a plastic sheet placed beneath the woman's buttocks immediately after delivery. Blood volume was recorded based on the calibrations marked on the pouch.

All participants, regardless of whether labor was induced, received Inj. Oxytocin 10 IU intramuscularly following placental expulsion.

Hemoglobin levels were recorded at admission, and again at 24 and 72 hours postpartum. The technician analyzing hemoglobin levels was blinded to the recorded blood loss.

Clinical parameters were monitored at admission and then postpartum every 30 minutes for the first hour, followed by assessments at 12-hour intervals.

All collected data were entered into a Microsoft Excel spreadsheet and subjected to statistical analysis. Continuous variables were analyzed using the unpaired t-test, one-way ANOVA, and Pearson's correlation coefficient. Categorical or nominal variables were assessed using the Fisher's exact test or Chi-square test, as appropriate. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1: Age-wise Distribution of Women in Induction and Spontaneous Labor Groups

Age Distribution (in years)	Induction Group		Spontaneous Group	
	No. of Women	Percentage	No. of Women	Percentage
<20	12	12 %	14	14 %
21-30	79	79 %	80	80 %
31-40	8	8 %	6	6 %
>40	1	1 %	0	0
Total	100	100	100	100
Mean ± SD	25.2±4.23		24.7±3.93	

The majority of participants in both groups belonged to the 21–30 years age group, accounting for 79% in the induction group and 80% in the spontaneous group. The mean age was slightly higher in the induction group (25.2 ± 4.23 years) compared to the spontaneous group (24.7 ± 3.93 years).

Table 2: Distribution of Women by Gestational Age in Induction and Spontaneous Labor Groups

Gestational Age (in weeks)	Induction Group		Spontaneous Group	
	No. of Patients	Percentage	No. of Patients	Percentage
37week - 38week 6 day	34	34	39	39
39week - 40week 6 day	41	41	48	48
≥41week	25	25	13	13
Total	100	100	100	100
Mean ± SD	38.32±1.42		38.08±1.19	

The mean gestational age was 38.32 ± 1.42 weeks in the Induction group and 38.08 ± 1.19 weeks in the Spontaneous group.

The most common reason was post-datism, accounting for 44% of cases, followed by leaking per vaginum or premature rupture of membranes (PROM) in 35% of women. Intrauterine growth restriction (IUGR) was the indication in 10% of cases, while oligohydramnios accounted for 7%. Rh-negative pregnancy was less common indications, reported in 4% of cases.

Table 3: Comparison of Estimated Blood Loss Between Induction and Spontaneous Labor Groups

Blood Loss (in ml)	Induction Group		Spontaneous Group	
	No. of Women	Percentage	No. of Women	Percentage
<500	84	84	91	91
500-1000	13	13	9	9
>1000	3	3	0	0
Total	100	100	100	100
Mean ±	335.4±158.97		266.2±212.80	

SD		
P-Value	0.009	

The table presents that, in induction group, 84% of women experienced blood loss of less than 500 ml, 13% had blood loss between 500–1000 ml, and 3% had blood loss exceeding 1000 ml. In contrast, 91% of women in the spontaneous group had blood loss below 500 ml, and 9% had between 500–1000 ml, with no cases of blood loss greater than 1000 ml. The mean blood loss in the induction group was higher (335.4 ± 158.97 ml) compared to the spontaneous group (266.2 ± 212.80 ml). This difference was statistically significant, with a p-value of 0.009, indicating greater blood loss associated with induced labor.

Table 4: Comparison of Haemoglobin Levels Before and After Delivery in Induction and Spontaneous Labor Groups

Haemoglobin (in g/dl)	Induction Group		Spontaneous Group		P-Value
	Mean	SD	Mean	SD	
Before Delivery	10.47	1.56	9.95	1.61	0.02
After Delivery	9.29	1.46	8.99	9.55	0.16

The table 04 presents that, the mean haemoglobin level before delivery was significantly higher in the induction group (10.47 ± 1.56 g/dl) compared to the spontaneous group (9.95 ± 1.61 g/dl), with a p-value of 0.02. However, after delivery, there was no statistically significant difference between the two groups (9.29 ± 1.46 g/dl in the induction group vs. 8.99 ± 9.55 g/dl in the spontaneous group; p=0.16).

Table 5: Comparison of Haematocrit Levels Before and After Delivery in Induction and Spontaneous Labor Groups.

Haematocrit	Induction Group		Spontaneous Group		P-Value
	Mean	SD	Mean	SD	
Before Delivery	34.34	2.75	34.12	3.19	0.6
After Delivery	27.45	5.67	28.16	4.91	0.34

The mean Haematocrit before delivery was 34.34 ± 2.75 in the induction group and 34.12 ± 3.19 in the spontaneous group ($p = 0.6$). After delivery, the mean Haematocrit was 27.45 ± 5.67 in the induction group and 28.16 ± 4.91 in the spontaneous group ($p = 0.34$). The differences observed between the two groups, both before and after delivery, were not statistically significant.

Table 6: Post-Delivery Blood Transfusion Requirement in Induction and Spontaneous Labor Groups

Post Delivery Blood Trans	Induction Group		Spontaneous Group		P-Value
	No. of Women	Percentage	No. of Women	Percentage	
Yes	10	10	3	3	0.04
No	90	90	97	97	
Total	100	100	100	100	

The table 04 presents that, in the induction group, 10 women (10%) required a blood transfusion after delivery, compared to only 3 women (3%) in the spontaneous group. This difference was statistically significant with a p-value of 0.04, indicating a higher likelihood of post-delivery blood transfusion in women who underwent induction compared to those with spontaneous onset of labor.

Discussion

The comparison of blood loss between spontaneous and induced vaginal deliveries in primigravidae is clinically important, as it helps guide obstetric decision-making and postpartum management.

In the present study, the mean age was slightly higher in the induction group (25.2 ± 4.23 years) than in the spontaneous group (24.7 ± 3.93 years). In a similar study, Jain P et al[7] observed that the highest proportion of participants were aged 26–30 years (44%), followed

by 31–35 years (26%) and 21–25 years (23%), with only 5% above 36 years and a mere 2% aged 20 years or younger. Likewise, Dagli S et al[8] noted a statistically significant age difference between groups, with the study group averaging 25.83 years and the control group 29.20 years (P = 0.02395). Mean gestational age was slightly higher with induction (38.32 ± 1.42 vs. 38.08 ± 1.19 weeks). In a similar observation, Soomro S B et al[9]reported that the mean gestational age was 39.06 ± 0.87 weeks in the induced group and 38.96 ± 0.84 weeks among spontaneous deliveries, reflecting a minimal but non-significant difference. Likewise, Anand N et al[10] found that the majority of cases (50.58%) were between 41–42 weeks, while only 12.94% exceeded 42 weeks, findings that were also echoed by Aleaxander J et al[11]

In our study, the estimated blood loss was notably higher in the induction group, with 84% losing <500 ml, 13% between 500–1000 ml, and 3% >1000 ml. The maximum blood loss in this 3% group cause in women who had undergone induction for prosdatism. In comparison, 91% in the spontaneous group lost <500 ml, 9% between 500–1000 ml, and none exceeded 1000 ml.Similarly, Soomro S B et al[9] reported a significantly higher mean blood loss in the induced group (424.54 ± 128.94 ml) compared to spontaneous deliveries (311.95 ± 113.73 ml), with the difference being highly significant (P = 0.000), reinforcing the trend toward increased bleeding with induction. In a related analysis, Kanakuze C A et al[12]noted that 50% of their small patient cohort required blood transfusion, suggesting that substantial blood loss or complications were equally present in induced cases, warranting vigilant postpartum monitoring. The comparison of post-delivery blood transfusion requirements revealed a significantly greater need in the induction group, where 10 women (10%) required transfusion, as opposed to only 3 women (3%) in the spontaneous labor group. The reason for the transfusion being mainly atonic PPH and genital tract trauma. Similarly, Mubasher S et al[13] reported a greater number of transfusions in the induction of labor (IOL) group, with 16 out of 54 women requiring it, compared to 9 out of 54 in the spontaneous onset of labor (SOL) group. However, in contrast to the present findings, this difference was not statistically significant (P = 0.110), indicating the observed increase might be incidental. Alalem D et al[14]alsoobserved a slightly higher frequency of blood transfusions in the induced group (2.6%) compared to the spontaneous group (0.5%). Although transfusion was infrequent overall (0.6% across all 311 cases), the findings hint at a trend toward increased transfusion risk with labor induction.

Conclusion

This comparative study evaluated blood loss and associated clinical parameters between spontaneous and induced vaginal deliveries. Post-dated pregnancy and premature rupture of membranes were the most common reasons for induction. Hemoglobin levels prior to delivery were significantly higher in the induction group, although post-delivery values were slightly different across both cohorts. Women who underwent induction experienced greater blood loss and were more likely to require post-delivery blood transfusion, indicating an elevated risk of postpartum hemorrhage in this group.

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