



ORIGINAL ARTICLE

## Comparison of the frequency of postpartum hemorrhage in induced labour and spontaneous labour in pregnant women.

Shazia Rafiq<sup>1</sup>, Syeda Ali<sup>2</sup>, Humaira Bashir<sup>3</sup>, Sajilah Karim<sup>4</sup>, Amtul Mateen<sup>5</sup>, Sarmad Zia<sup>6</sup>

**Article Citation:** Rafiq S, Ali S, Bashir H, Karim S, Mateen A, Zia S. Comparison of the frequency of postpartum hemorrhage in induced labour and spontaneous labour in pregnant women. Professional Med J 2023; 30(10):1264-1269. <https://doi.org/10.29309/TPMJ/2023.30.10.7669>

**ABSTRACT... Objective:** To compare the frequency of postpartum hemorrhage in induced labour and spontaneous labour in pregnant women. **Study Design:** Cross-sectional study. **Setting:** Department of Obstetrics and Gynecology, Nishtar Hospital, Multan. **Period:** January 2023 to June 2023. **Material & Methods:** A total number of 262 pregnant women aged 20-40 years, having gestational age 37 to 42 weeks were analyzed. Baseline demographic information of patients (age, gestational age, parity, weight and previous history of PPH) was taken. Mode of delivery (spontaneous/induced) was noted in all women and postpartum hemorrhage after delivery was also noted. **Results:** In a total of 262 pregnant women, the mean age was  $31.28 \pm 4.96$  years while mean gestational age at the time of delivery was  $39.74 \pm 1.62$  weeks. The mean weight was  $64.47 \pm 7.65$  kg. Comparison of the post-partum hemorrhage between modes of labour showed that 28 (21.4%) undergoing induced induction and 10 (7.6%) in spontaneous labour had post-partum hemorrhage ( $p=0.002$ ). **Conclusion:** Post-partum hemorrhage is a common complication of induced labour. Postpartum hemorrhage needs to be taken into account especially when induction of labour is being considered.

**Key words:** Gestational Age, Induced Labour, Parity, Post-partum Hemorrhage, Spontaneous Labour.

### INTRODUCTION

Traditionally, the incidence of maternal mortality was calculated to be around 385 per 100,000 births globally, which dropped during that period of 1990-2015 to 216 per 100,000 births.<sup>1</sup> The maternal mortality rates has not reached the 75% reduction target set by “The Millennium Development Goals (MDG) framework” and “The Sustainable Development Goals (SDGs)” formed in 2015 which emphasized the continuous commitment to lowering maternal mortality and set a target of bringing it down to fewer than 70 deaths per 100,000 births by the year 2030.<sup>2</sup> Data from Pakistan has documented high maternal mortality rates revolving around 186 deaths per 100,000 live-births in 2019, and there has been a 32% rise in mortality rate from 2017 (140/100,000 live-births). Postpartum hemorrhage (PPH) is known to be an important contributor to maternal mortality, responsible for around 20% of all maternal fatality cases globally and is defined as

the condition developed by losing more than 500 mL of blood within 24 hours of giving birth.<sup>3-5</sup>

There is conflicting evidence about how labour induction affects the labour’s length, maternal fetal outcomes and labour problems.<sup>6,7</sup> In accordance with some of the studies, labour induction is considered to be a risk factor in increasing PPH-like complications caused by over activity of the uterus or postpartum uterine atony from uterine fatigue, while some describe an increased rate of caesarean section due to fetal distress.<sup>8,9</sup> Once labour is induced, nulliparity, obesity, advanced maternal age, foetal macrosomia and chorioamnionitis raise the likelihood of caesarian section.<sup>7,8</sup> PPH is also associated with assisted birth, blood transfusion, a prolonged hospital stay, urgency in caring for the neonate and admission into the neonatal intensive care unit (NICU).<sup>8</sup> A certain number of these perinatal outcomes might, however, be linked with

1. MBBS, FCPS (Obs & Gyne), Assistant Professor Obstetrics & Gynecology, Nishtar Medical University and Hospital, Multan.  
2. MBBS, FCPS (Obs & Gyne), Associate Professor Obstetrics & Gynecology, Nishtar Medical University and Hospital, Multan.  
3. MBBS, FCPS (Obs & Gyne), Senior Registrar Obstetrics & Gynecology, Nishtar Medical University and Hospital, Multan.  
4. MBBS, FCPS, Senior Registrar Obstetrics & Gynecology, Nishtar Medical University and Hospital, Multan.  
5. MBBS, Postgraduate Resident Obstetrics & Gynecology, Nishtar Medical University and Hospital, Multan.  
6. MBBS, Postgraduate Resident Obstetrics & Gynecology, Nishtar Medical University and Hospital, Multan.

**Correspondence Address:**

Dr. Shazia Rafiq  
Department of Obstetrics & Gynecology  
Nishtar Medical University and Hospital,  
Multan.  
sshahidmt@gmail.com

**Article received on:** 03/05/2023  
**Accepted for publication:** 14/07/2023

particular pathological conditions that required the induction of labour instead of spontaneous labour. Abisowo OY et al described the frequency of PPH in their study as 45.5% in induced labour versus 25.0% in spontaneous labour.<sup>10</sup>

This research was carried out to compare the frequency of PPH in induced labour and spontaneous labour in pregnant women. The findings of this study might encourage early anticipation of PPH to improve the outcomes which could further assist to decrease the maternal and fetal mortality as well as morbidity, and hospital stays.

### MATERIAL & METHODS

This observational, cross-sectional study was carried out at the department of obstetrics and gynecology, Nishtar Hospital, Multan, Pakistan, from January 2023 to June 2023. A sample size of 262 was calculated using postpartum hemorrhage in population with induced labour (P1)=45.5%<sup>10</sup> and postpartum hemorrhage in population with spontaneous labour (P2)=25%<sup>10</sup>, with 95% confidence level, margin of error as 5%, and with absolute precision of 0.008. Non-probability consecutive sampling technique was employed.

Inclusion criteria were women of age between 20 and 40 years with a singleton pregnancy on ultrasound, a gestational age of 37-42 weeks on LMP, any parity, and who were undergoing normal vaginal delivery. Exclusion criteria were women with antenatal polyhydramnios on ultrasound, coagulopathies (INR >1.5), pre-eclampsia (B.P >140/90 at 2 different occasions 6 hours apart plus proteinuria), diagnosed medical disorders, which included spontaneous lupus erythematosus, liver disease, heart disease (through medical record), previous history of parineal tear (through medical record), and having anticoagulant drugs (through medical record). The women undergoing the use of forceps and/or vacuum were also excluded. Informed and written consents were obtained from patients, ensuring confidentiality and the fact that there would be no risk to the patient while taking part in this study. Permission from the "Institutional Ethical Committee" was taken

(6585-13-05-2023).

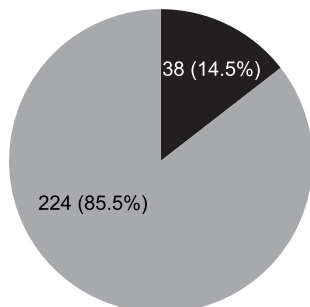
At the time of enrollment, baseline demographics like age, gestational age, parity, weight and previous history of PPH were recorded. Mode of delivery (spontaneous or induced) was noted in all women. Labour that went on itself and required no induction was termed "spontaneous labour." Induced labour was the planned initiation of labour prior to its spontaneous onset. It was carried out by prostaglandin E2 vaginal gel (1g), and the dose was repeated at six hourly intervals for a maximum of three doses at 41 weeks. The PPH after delivery was noted and defined as the occurrence of blood loss  $\geq 500$  ml within 24 hours of vaginal delivery. Soaked gauze pads were used to measure the blood loss (measured by subtracting pre-use weight from post-use weight) and blood clots, which were weighed, standardizing one milliliter of blood to one gram. All the obtained information were recorded on an especially designed proforma. Study intervals were at 6 hours per 2 hours and then at 24 hours per 4 hour.

Statistical analysis was done using "Statistical Package for Social Sciences (SPSS)", version 26.0. Quantitative variables like age, gestational age, weight, and parity were shown as mean and standard deviation (SD). Qualitative variables like mode of delivery, postpartum hemorrhage and previous history of PPH were presented by computing frequency and percentage. The comparison of postpartum hemorrhage in both groups was done by applying the chi-square test and a p-value  $\leq 0.05$  was considered significant. Age, gestational age, parity, weight, and previous history of PPH were stratified to assess the effect of these effect modifiers on PPH. A post-stratification chi-square test for both groups was applied and a p-value  $\leq 0.05$  was considered as significant.

### RESULTS

A total of 262 women were analyzed and the mean age was  $31.28 \pm 4.96$  years (ranging between 20 to 40 years). The mean gestational age at the time of delivery was  $39.74 \pm 1.62$  weeks (ranging between 37 to 42 weeks). The mean weight was

64.47 ± 7.65 kg (ranging between 45 to 80 kg). The mean parity was 1.93 ± 0.98 (ranging between 1 to 4). The frequency of previous history of PPH was reported by 23 (8.8%) women. The frequency of PPH was noted in 38 (14.5%) women in this study (Figure-1).



■ Postpartum Hemorrhage ■ No Postpartum Hemorrhage

Figure-1. Frequency of postpartum hemorrhage

On comparison of PPH between modes of labour, PPH was found in 28 (21.4%) women who were induced and 10 (7.6%) who underwent spontaneous labour (p=0.002) as showed in Table-I.

There was no association of age with post-partum hemorrhage between modes of labour (p>0.05). There was a strong association of gestational age between 37-39 weeks with PPH and modes of labour (p<0.001). Weight between 66-80 kg (p=0.001), parity status between 1-2 (p=0.003) and history of PPH (p=0.001) had significant association with mode of labour and existence of PPH as shown in Table-II.

Postpartum Hemorrhage	Modes of Labour		P-Value
	Induced (n=131)	Spontaneous (n=131)	
Yes	28 (21.4%)	10 (7.6%)	0.002
No	103 (78.6%)	121 (92.4%)	

Table-I. Comparison of postpartum hemorrhage between modes of labour (N=262)

Study Variables		Postpartum Hemorrhage	Mode of Labour		P-Value
			Induced	Spontaneous	
Age (years)	20-31	Yes	7 (58.3%)	5 (41.7%)	0.088
		No	42 (32.1%)	83 (67.9%)	
	32-40	Yes	21 (80.8%)	5 (19.2%)	0.067
		No	61 (61.6%)	38 (38.4%)	
Gestational age (weeks)	37-39	Yes	19 (82.6%)	4 (17.4%)	<0.001
		No	39 (68.4%)	59 (31.6%)	
	40-42	Yes	9 (60.0%)	6 (40.0%)	0.500
		No	64 (50.8%)	62 (49.2%)	
Weight (kg)	45-65	Yes	6 (60.0%)	4 (40.0%)	0.465
		No	60 (48.0%)	65 (52.0%)	
	66-80	Yes	22 (78.6%)	6 (21.4%)	0.001
		No	43 (43.4%)	56 (56.4%)	
Parity	1-2	Yes	17 (77.3%)	5 (22.7%)	0.003
		No	74 (44.0%)	94 (56.0%)	
	3-4	Yes	11 (68.8%)	5 (31.2%)	0.228
		No	29 (51.8%)	27 (48.2%)	
History of postpartum hemorrhage	Yes	Yes	26 (76.5%)	8 (23.5%)	0.001
		No	95 (46.3%)	110 (53.7%)	
	No	Yes	2 (50.0%)	2 (50.0%)	0.772
		No	8 (42.1%)	11 (57.9%)	

Table-II. Stratification of study variables with post-partum hemorrhage between modes of labour (n=262)

## DISCUSSION

The "World Health Organization" describes hemorrhage and hypertensive disorders to be significant causes of maternal mortality in developing parts of the world, and out of all reported deaths, the contribution of PPH is around 25%.<sup>11</sup> It has been shown in the studies that inductions performed between 1989 and 1997 had reached nearly twice when compared to previous rates.<sup>9</sup> Currently, labour induction among all pregnancies is estimated to annual incidence rates between 9.5 to 33.7%.<sup>12</sup> The PPH occurs as a prime causative factor in maternal mortality and morbidity throughout the world and its incidence has shown an increasing trend in the last few decades.<sup>13-15</sup>

In our study, the frequency of PPH among women undergoing vaginal deliveries (spontaneous or induced labour) was compared. Those women underwent induced labour through augmentation or by inducing oxytocin are believed to have more 3<sup>rd</sup> stage blood loss as compared to the women who undergo spontaneous delivery.<sup>16</sup> One possible reason for this occurrence could be that during the first stage of labor, the contraction of the uterus is regulated by the hormone oxytocin. However, sometimes after the baby is delivered and the placenta is expelled, the uterus may fail to respond adequately to the oxytocin hormone. Another frequently cited reason is the inappropriate oxytocin usage among these women to precipitate labour more incidental. Besides, prostaglandins are ahead of oxytocin in the induction of structural changes in poorly ripen cervix and provide better dilatation during the 1<sup>st</sup> stage of labour, so their usage is more common in the cotemporary world.<sup>17</sup> The availability of various analogues of prostaglandins that can be administered through different routes are their additive advantage.<sup>18</sup> Various studies have reported the association of prostaglandin-induced labour with a decrease in blood loss during the third stage of labour.<sup>19</sup>

In this study, we found a significant association between induction of labour and PPH as PPH was found in 21.4% women in induced labour and 7.6% women in spontaneous delivery. A

study by Hussain et al reported PPH in 6.8% of patients having spontaneous labour and in 11.4% women with induced labour.<sup>20</sup> Another study by Al-Turahi et al described that PPH was noted in 3.1% of women with induced labour and in only 1.3% of women with spontaneous labour.<sup>21</sup> These studies reported that induced labour had a significant association with an increase in the risk of PPH.<sup>20,21</sup> In a Jamaican study, the occurrence of blood loss following the induction of misoprostol was studied. It revealed that at delivery, the mean blood loss in all women having induced labour was significantly higher than in those who had spontaneous labour. The mean blood loss shown by misoprostol was 162.5±190 mL, oxytocin 150±100 mL and oxytocin plus misoprostol 150±150 mL while it was 100±130 mL in controls that did not need oxytocin prior to delivery.<sup>22</sup>

Parturition has become relatively safer due to labour induction using modern methods that include prostaglandins, but in certain conditions, the usage of oxytocin is more advantageous like when there is a need for labour augmentation in particular. Although the occurrence of postpartum hemorrhage can be observed with any delivery technique, whether it is vaginal or induced (oxytocin or prostaglandin), early diagnosis is of great importance in bringing down the associated maternal mortality and morbidity.

## CONCLUSION

Post-partum hemorrhage is a common complication of induced labour. Postpartum hemorrhage needs to be taken into account especially when induction of labour is being considered.






**Copyright© 14 July, 2023.**

## REFERENCES

1. Alkema L, Chou D, Hogan D. **Global, regional, and national levels and trends in maternal mortality between 1990 and 2015, with scenario-based projections to 2030: A systematic analysis by the UN maternal mortality estimation inter-agency group.** Lancet. 2016; 387(3):462-74.
2. Say L, Chou D, Gemmill A. **Global causes of maternal death: A WHO systematic analysis.** Lancet Glob Health. 2014; 2:e323-e333.

3. **National Institute of population studies.** <https://nips.org.pk/publication/pakistan-maternal-mortality-survey-pmms-2019-main-report>.
4. **Pakistan Maternal mortality ratio, 1960-2021 - knoema.com.** <https://knoema.com/atlas/Pakistan/topics/Health/Health-Status/Maternal-mortality-ratio>
5. McLintock C. **Prevention and treatment of postpartum hemorrhage: Focus on hematological aspects of management.** *Hematology Am Soc Hematol Educ Program.* 2020; 2020(1):542-546. doi:10.1182/hematology.2020000139
6. Beshir YM, Kure MA, Egata G, Roba KT. **Outcome of induction and associated factors among induced labours in public Hospitals of Harari Regional State, Eastern Ethiopia: A two years' retrospective analysis.** *PLoS One.* 2021; 16(11):e0259723. doi:10.1371/journal.pone.0259723
7. Middleton P, Shepherd E, Morris J, Crowther CA, Gomersall JC. **Induction of labour at or beyond 37 weeks' gestation.** *Cochrane Database Syst Rev.* 2020; 7(7):CD004945. doi:10.1002/14651858.CD004945.pub5
8. Caughey AB, Sunduram V, Kaimal AJ, Gienger A, Cheng YW, MacDonald KM. **Systematic review: Elective induction of labour versus expectant management of pregnancy.** *Ann Intern Med.* 2009; 151:252-63.
9. Sinkey RG, Lacey J, Reljic T. **Elective induction of labor at 39 weeks among nulliparous women: The impact on maternal and neonatal risk.** *PLoS One.* 2018; 13(4):e0193169.
10. Abisowo OY, Oyinyechi AJ, Olusegun FA, Oyedokun OY, Motunrayo AF, Abimbola OT. **Feto-maternal outcome of induced versus spontaneous labour in a Nigerian tertiary maternity unit.** *Trop J Obstet Gynaecol.* 2017; 34(1):21-7.
11. Amanuel T, Dache A, Dona A. **Postpartum hemorrhage and its associated factors among women who gave birth at Yirgalem General Hospital, Sidama Regional State, Ethiopia.** *Health Serv Res Manag Epidemiol.* 2021; 8:23333928211062777. doi:10.1177/23333928211062777
12. Brun R, Spoerri E, Schäffer L, Zimmermann R, Haslinger C. **Induction of labor and postpartum blood loss.** *BMC Pregnancy Childbirth.* 2019; 19(1):265.
13. Tesfaye G, Loxton D, Chojenta C, Assefa N, Smith R. **Magnitude, trends and causes of maternal mortality among reproductive aged women in Kersa health and demographic surveillance system, eastern Ethiopia.** *BMC Womens Health.* 2018; 18(1):1-10.
14. Ngwenya S. **Postpartum hemorrhage: Incidence, risk factors, and outcomes in a low-resource setting.** *Int J Womens Health.* 2016; 8:647-650. doi:10.2147/IJWH.S119232
15. Lancaster L, Barnes RFW, Correia M, Luis E, Boaventura I, Silva P, et al. **Maternal death and postpartum hemorrhage in sub-Saharan Africa - A pilot study in metropolitan Mozambique.** *Res Pract Thromb Haemost.* 2020; 4(3):402-412. doi:10.1002/rth2.12311
16. Brun R, Spoerri E, Schäffer L, Zimmermann R, Haslinger C. **Induction of labor and postpartum blood loss.** *BMC Pregnancy Childbirth.* 2019; 19(1):265. doi:10.1186/s12884-019-2410-8
17. Warke HS, Saraogi RM, Sanjwalla SM. **Prostaglandin E2 gel in ripening of cervix in induction of labour.** *J Postgrad Med.* 1999; 45(1):105.
18. **RCOG (Royal College of Obstetricians and gynaecologists clinical effectiveness support unit).** 2001. *method of induction.* ch. 6. *Induction of labour: evidence-based clinical guideline, No. 9.* London: RCOG Press.
19. Calder AA. **Review of prostaglandin use in labour induction.** *Br J Obstet Gynaecol.* 1997; 104(1):2-7.
20. Hussain SS, Shafqat T. **Frequency of postpartum haemorrhage in induced versus spontaneous labour.** *Pak J Med Health Sci.* 2014; 8(3):659-62.
21. Al-Turiah AM, Sadiqa AM, Abbas EA. **The incidence of postpartum hemorrhage after spontaneous and induced vaginal delivery versus elective and emergency caesarian section.** *Am J BioMed.* 2016; 4(1):81-90.
22. Phillip H, Fletcher H, Reid M. **The impact of induced labour on postpartum blood loss.** *J Obstet Gynaecol.* 2004; 24(1):12-5.

**AUTHORSHIP AND CONTRIBUTION DECLARATION**

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Shazia Rafiq	Study concept, Data collection, Drafting.	
2	Syeda Ali	Data analysis, Proof reading.	
3	Humaira Bashir	Methodology, Discussion.	
4	Sajilah Karim	Data collection, Literature review.	
5	Amtul Mateen	Data collection, Literature review.	
6	Sarmad Zia	Data collection, Literature review.	