DOI: https://doi.org/10.54393/pjhs.v6i7.3268

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 6, Issue 07 (July 2025)

Original Article

OPEN ACCESS

Comparison of Frequency of Postpartum Haemorrhage in Augmented Versus Spontaneous Labour

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ARTICLE INFO

Keywords:
Postpartum Haemorrhage, Spontaneous Labour, Augmented Labour, Vaginal Delivery, Hypertension

How to Cite:
Tariq, M., Rafeeq, S., Jadoon, S., Ara, C., Hamid, B. S., & Rauf, I. (2025). Comparison of Frequency of Postpartum Haemorrhage in Augmented Versus Spontaneous Labour: Postpartum Haemorrhage in Augmented Versus Spontaneous Labour. Pakistan Journal of Health Sciences, 6(7), 37-42. https://doi.org/10.54393/pjhs.v6i7.3268

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Received Date: 16th May, 2025
Revised Date: 9th July, 2025
Acceptance Date: 12th July, 2025
Published Date: 31st July, 2025

ABSTRACT

Postpartum haemorrhage (PPH) remains a major cause of maternal morbidity and mortality. Labour augmentation is commonly practiced but may increase the risk of excessive bleeding. **Objectives:** To determine the frequency of PPH and compare its occurrence in spontaneous versus augmented labour. **Methods:** A descriptive cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Mardan Medical Complex, from August 2023 to January 2024. A total of 151 women aged 18–40 years with singleton pregnancies at ≥36 weeks were enrolled using non-probability consecutive sampling. Data on age, parity, gestational age, hypertension, socioeconomic and residential status, labour type, and PPH were collected through a structured proforma. PPH was defined as blood loss >500 ml within 24 hours of vaginal delivery. Data were analyzed using SPSS version 25.0, and associations were tested using Chi-square and Fisher's exact tests. **Results:** The frequency of PPH was 13.2%. PPH occurred more frequently in spontaneous labour (15.7%) compared to augmented labour (10.3%), though this was not statistically significant (p=0.333). A significant association was found between hypertension and PPH (p=0.017), with hypertensive women showing a higher risk. **Conclusions:** It was concluded that Hypertension was significantly associated with postpartum haemorrhage, underscoring the importance of careful monitoring. Labour augmentation did not significantly increase PPH risk. Ongoing evaluation of maternal risk factors is crucial for improving outcomes.

INTRODUCTION

Postpartum haemorrhage (PPH) remains a major contributor to maternal morbidity and mortality worldwide [1]. Despite advances in obstetric care, excessive bleeding after childbirth continues to claim the lives of thousands of women each year, particularly in low- and middle-income countries. Defined clinically as a blood loss of more than 500 ml following vaginal delivery, or more than 1000 ml following caesarean section, PPH demands prompt recognition and effective intervention to prevent serious outcomes [2, 3]. Recent changes in obstetric practice and variations in clinical definitions have made the true burden of PPH difficult to quantify [4]. While traditional estimates rely on visual assessment of blood loss, more accurate methods, such as weighing blood-soaked materials, have revealed that actual rates of PPH may be higher than previously documented. Moreover, symptoms such as hypotension and tachycardia may not manifest until a woman has lost a significant portion of her total blood volume, highlighting the danger of relying solely on clinical signs [5, 6]. Among the risk factors contributing to PPH,

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labour induction and augmentation have drawn increasing attention. Induced or augmented labour, often necessary for medical or obstetric reasons is associated with a higher risk of uterine atony, a leading cause of PPH [7]. The use of oxytocin and prostaglandins, while effective for initiating or intensifying contractions, may also increase the likelihood of uterine muscle fatigue, thereby impairing postpartum contractility and elevating haemorrhage risk. With the growing trend of elective inductions, particularly for reasons such as post-term pregnancy or maternal preference, it is essential to examine whether these interventions contribute significantly to adverse maternal outcomes [8]. Evidence from local studies suggests a discrepancy in PPH rates between women undergoing spontaneous and augmented labour. For instance, research conducted in Pakistan has reported higher rates of haemorrhage among those whose labour was medically managed compared to those with spontaneous onset [9, 10]. However, these findings remain underexplored in many clinical settings, particularly in regional hospitals where resources may be limited and monitoring protocols variable. Given the clinical importance of timely recognition and management of postpartum haemorrhage, especially in induced or augmented labours, this study seeks to fill the gap by comparing the frequency of PPH in women who underwent spontaneous versus augmented labour. Findings from this research are expected to guide obstetric decision-making, improve maternal safety protocols, and contribute to broader public health efforts aimed at reducing preventable maternal deaths.

This study aims to determine the frequency of PPH and compare its occurrence in spontaneous versus augmented labour.

METHODS

The descriptive cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Mardan Medical Complex, in collaboration with Bacha Khan Medical College, Mardan. The duration of the study was six months, from August 2023 to January 2024. This study aimed to determine the frequency of postpartum haemorrhage (PPH) in women undergoing spontaneous versus augmented labour. Before the initiation of data collection, formal ethical approval was obtained from the Institutional Ethical Committee of Bacha Khan Medical College, Mardan (Approval No. 353/BKMC). Additionally, the synopsis was approved by the Research Evaluation Unit (REU) of the College of Physicians and Surgeons Pakistan (CPSP) under reference number CPSP/REU/OBG-2022-028-11418. Written informed consent was secured from all participants, ensuring confidentiality, voluntary participation, and the right to withdraw at any stage. A sample size of 151 participants was calculated using WHO sample size software, with a 95% confidence level and an expected postpartum haemorrhage rate of 11%. A non-probability consecutive sampling technique was used, enrolling all eligible women who met the inclusion criteria during the study period. Participants were eligible if they met the criteria like, aged between 18 and 40 years, singleton pregnancy confirmed on ultrasound, gestational age greater than 36 weeks (based on last menstrual period), any parity and undergoing vaginal delivery. Women were excluded if they had a known history of bleeding disorders such as disseminated intravascular coagulation (DIC), aplastic anaemia and thrombocytopenia. Participants were enrolled after verification of inclusion and exclusion criteria. A structured, pre-tested proforma was used to collect patient demographics, obstetric history, and clinical data, including maternal age, gestational age, parity, residential status (urban or rural), socioeconomic status (poor, middle, rich), hypertension status, labour type (spontaneous or augmented), and PPH outcome. Labour type was defined as follows: Spontaneous labour was determined by the presence of regular uterine contractions with progressive cervical dilation >3 cm without medical intervention. Augmented labour involved the use of intravenous oxytocin, starting at 12 ml/hour and increasing by 12 ml/hour every 30 minutes up to a maximum of >192 ml/hour. In some cases, prostaglandin E2 vaginal gel (1 gram) was administered, repeated at six-hour intervals up to three doses. Postpartum haemorrhage was identified based on a blood loss exceeding 500 ml within 24 hours after vaginal delivery. Blood loss was measured using soaked gauze, surgical pads, and visible clots, following a gravimetric method where a 1-gram weight difference equalled 1 ml of blood loss. To ensure consistency and accuracy, data collectors received uniform training on identifying labour types and estimating blood loss. Standard clinical definitions were strictly followed. The proforma was reviewed by obstetric consultants for face and content validity. Daily cross-checking with patient files and labour ward registers was conducted to maintain data integrity. Data were entered and analyzed using IBM SPSS version 25.0. Descriptive statistics, including mean and standard deviation, were used for continuous variables like age, parity, and gestational age. Categorical variables hypertension status, labour type, parity, and residential status, were presented as frequencies and percentages. To compare the frequency of PPH across different categories, the Chi-square test or Fisher's exact test was applied where appropriate. A p-value≤0.05 was considered statistically significant. Post-stratification analysis was conducted for factors such as maternal age group, parity, gestational age, hypertension, socioeconomic status, and labour type to assess their association with PPH.

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RESULTS

The study included a total of 151 participants. The mean maternal age was 28.29 ± 6.78 years, with a range between 18 and 40 years. The average gestational age at delivery was 39.31 ± 0.94 weeks, ranging from 37.08 to 41.48 weeks. The mean number of births (parity) was 1.40 ± 1.45, with a range from 0 to 4. Most participants (40.4%) were between 26–35 years of age, while 38.4% were 18–25 years, and 21.2% were in the 36–40 age bracket. The majority (58.3%) were delivered between 39–40 weeks of gestation. A higher proportion of women were multiparous (58.3%) compared to primiparous (41.7%). Most resided in urban areas (64.2%), and the largest group belonged to the middle socioeconomic class (50.3%). Regarding comorbidities, 31.8% had hypertension. Spontaneous labour was observed in 55.0% of cases, while 45.0% underwent augmented labour. The overall frequency of postpartum haemorrhage (PPH) in this sample was 13.2% (Table 1).

Table 1: Demographic and Clinical Characteristics of Participants (n=151)

Categorical Variables	Categories	Frequency (%)
Age Group (Years)	Range: 18–40	28.29 ± 6.78
	18–25	58 (38.4%)
	26–35	61 (40.4%)
	36–40	32(21.2%)
Gestational Age (Weeks)	Range: 37.08–41.48	39.31 ± 0.94
	37–38	41 (27.2%)
	39–40	88 (58.3%)
	>40	22 (14.6%)
Parity	Range: 0–4	1.40 ± 1.45
	Primiparous	63 (41.7%)
	Multiparous	88 (58.3%)
Residential Status	Urban	97 (64.2%)
	Rural	54 (35.8%)
Socioeconomic Status	Poor	52 (34.4%)
	Middle	76 (50.3%)
	Rich	23 (15.2%)
Hypertension	Yes	48 (31.8%)
	No	103 (68.2%)
Labour Type	Spontaneous	83 (55.0%)
	Augmented	68 (45.0%)
Postpartum Haemorrhage	Yes	20 (13.2%)
	No	131 (86.8%)

There was no statistically significant association between maternal age group and the occurrence of PPH ($\chi^2 = 1.080$, df=2, p=0.583). Although the highest rate of PPH (18.8%) was seen among women aged 36–40 years, the distribution across all age groups did not show meaningful differences. This suggests that maternal age alone may not be a strong predictor of postpartum bleeding in this sample. Gestational age at the time of delivery was not significantly associated with PPH ($\chi^2 = 2.989$, df=2, p=0.224). However, a trend was noted where the incidence of PPH increased with advancing gestational age, rising from 4.5% in post-term pregnancies (>40 weeks) to 17.0% in those delivering at 39–40 weeks. Despite this trend, the statistical analysis did not support a meaningful correlation. Parity did not show a significant association with the risk of PPH ($\chi^2 = 1.672$, df=1, p=0.196). However, primiparous women had a higher incidence of PPH (17.5%) compared to multiparous women (10.2%). Though not statistically significant, this pattern may reflect a clinical tendency for first-time mothers to be more vulnerable to labour complications, warranting further exploration (Table 2).

Table 2: Association Between Age Group, Gestational Age Parity and Postpartum Haemorrhage (n=151)

Variables	PPH Yes (n)	PPH No (n)	Total (n)	% with PPH	χ^2 (df), p-Value
Age Group (Years)					
18–25	7	51	58	12.1%	$\chi^2 = 1.080$, (df=2), p=0.583
26–35	7	54	61	11.5%	
36–40	6	26	32	18.8%	
Total	20	131	151	13.2%	
Gestational Age (Weeks)					
>40	1	21	22	4.5%	$\chi^2 = 2.989$, (df=2), p=0.224
37–38	4	37	41	9.8%	
39–40	15	73	88	17.0%	
Total	20	131	151	13.2%	
Parity					
Primiparous	11	52	63	17.5%	$\chi^2 = 1.672$, (df = 1), p=0.196
Multiparous	9	79	88	10.2%	
Total	20	131	151	13.2%	

The relationship between place of residence and PPH was not statistically significant ($\chi^2 = 2.493$, df=1, p=0.114). Nevertheless, PPH was more frequently observed in urban residents (16.5%) than in rural counterparts (7.4%). While not statistically conclusive, the difference may reflect disparities in maternal care access, healthcare-seeking behaviour, or obstetric interventions across settings. No significant association was identified between socioeconomic status and PPH ($\chi^2 = 4.380$, df=2, p=0.112). However, a notably higher rate of PPH (26.1%) was found among women in the high-income category. This could potentially be due to increased rates of elective interventions or underlying risk factors, although the finding did not reach statistical significance. Labour type was not significantly associated with PPH in this cohort ($\chi^2 = 0.938$, df=1, p=0.333). Interestingly, spontaneous labour had a slightly higher rate of PPH (15.7%) compared to augmented labour (10.3%), contrary to expected trends. However, due to the lack of statistical significance, this difference may be attributed to random variation rather than a causal link (Table 3).

DOI: https://doi.org/10.54393/pjhs.v6i7.3268

Table 3: Association Between Residential Status, Socioeconomic Status, Labour Type and Postpartum Haemorrhage (n=151)

Variables	PPH Yes (n)	PPH No (n)	Total (n)	% with PPH	χ^2 (df), p-Value
Residential Status					
Rural	4	50	54	7.4%	$\chi^2 = 2.493$, (df=1), p=0.114
Urban	16	81	97	16.5%	
Total	20	131	151	13.2%	
Socioeconomic Status					
Poor	7	45	52	13.5%	$\chi^2 = 4.380$, (df=2), p=0.112
Middle	7	69	76	9.2%	
Rich	6	17	23	26.1%	
Total	20	131	151	13.2%	
Labour Types					
Augmented	7	61	68	10.3%	$\chi^2 = 0.938$, (df=1), p=0.333
Spontaneous	13	70	83	15.7%	
Total	20	131	151	13.2%	

Hypertension showed a statistically significant relationship with PPH ($\chi^2 = 5.728$, df = 1, p=0.017; Cramér's V=0.195). Women with hypertension experienced more than twice the rate of PPH (22.9%) compared to normotensive women (8.7%). This finding highlights hypertension as an important clinical risk factor for postpartum bleeding, underlining the need for close monitoring and preventive strategies in hypertensive pregnancies (Table 4).

Table 4: Association Between Hypertension and Postpartum Haemorrhage (n=151)

Hypertension	PPH Yes (n)	PPH No (n)	Total (n)	% with PPH	χ^2 (df), p-Value	Cramér's V
Yes	11	37	48	22.9%	$\chi^2 = 5.728$, (df=1), p=0.017	0.195
No	9	94	103	8.7%		
Total	20	131	151	13.2%		

The chart shows that the most represented age group was 26–35 years, followed closely by 18–25 years. A significant portion of deliveries occurred between 39–40 weeks of gestation. Multiparous women formed the majority, and most participants lived in urban areas. Middle-income status was the most common socioeconomic group. From a clinical standpoint, a considerable proportion of the sample had hypertension (31.8%). Spontaneous labour was more frequent than augmented labour. Although only 13.2% of participants experienced postpartum haemorrhage (PPH), the graph emphasises that high-risk categories such as hypertensive patients, primiparous women, and urban residents showed a noticeable share of PPH cases. Visually, the gap between frequency and percentage bars also reflects distribution weight across categories, while "PPH No" cases dominate in count, the PPH Yes group still presents critical clinical implications in terms of relative proportion among certain subgroups.

DISCUSSION

This study explored the frequency of postpartum haemorrhage (PPH) in women undergoing spontaneous versus augmented labour at a tertiary care facility in Mardan. The overall frequency of PPH was 13.2%, which is slightly higher than the global average reported by the World Health Organization, where PPH complicates approximately 10% of vaginal deliveries. This variation could be attributed to local obstetric practices, population characteristics, or referral patterns. Our findings showed that maternal age did not significantly influence the likelihood of PPH, although the highest rate (18.8%) was observed in women aged 36–40 years. This was consistent with Rafiq *et al.*, Bernitz *et al.*, and Cheng *et al.*, 2025 and suggests that advanced maternal age may be linked with reduced uterine contractility and vascular changes, but such associations may not always reach statistical significance in mid-sized samples [11-13]. Similarly, gestational age did not demonstrate a significant correlation with PPH. While a rising trend in PPH was seen with increasing gestational duration peaking at 17% in the 39–40-week group, this did not meet statistical criteria. Previous literature, like Kumar *et al.*, Mentzoni *et al.*, and Khurshid *et al.*, indicates that prolonged gestation may increase uterine atony risk, though confounding factors such as induction method and birth weight may play a role, which were not the focus of this study [14-16]. Parity also failed to show a statistically significant association. However, primiparous women exhibited a higher incidence of PPH (17.5%) compared to multiparous women (10.2%). This aligns with previous reports like Zhu *et al.*, Pettersen *et al.*, and Girault *et al.*, that suggest first-time mothers may be more prone to labour-related complications due to prolonged second-stage labour, ineffective uterine contractions, or lack of delivery experience among attending staff in certain settings [17-19]. Residential status and socioeconomic status, while not statistically significant, revealed notable trends. Urban residents and women from higher-income groups experienced more PPH than their rural and lower-income counterparts. These findings were counterintuitive to the assumption that better-resourced populations have improved outcomes. However, elective labour interventions, stress, or delayed presentation in urban centres might contribute to this disparity [20, 21]. Importantly, hypertension emerged as a significant risk factor for PPH, with a rate of 22.9% among hypertensive women compared to 8.7% in normotensive patients (p=0.017). This finding echoes multiple studies where hypertensive disorders in pregnancy, preeclampsia, were linked with abnormal placentation, coagulopathy, and uterine atony, increasing bleeding risks post-delivery. Therefore, early detection and close management of hypertensive women during labour are essential to reduce

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maternal morbidity [22, 23]. Contrary to some expectations, the type of labour, spontaneous versus augmented, did not significantly impact the risk of PPH. Interestingly, PPH was slightly more common in spontaneous labour (15.7%) than in augmented cases (10.3%). This may suggest that with proper monitoring and protocol-driven augmentation using oxytocin and prostaglandins, blood loss can be controlled. Alternatively, it may reflect an underestimation of bleeding in spontaneous cases, where the anticipation of complications may be lower.

CONCLUSIONS

The study highlights that postpartum haemorrhage remains a pressing concern in obstetric care, affecting over 13% of women delivering vaginally. While maternal age, parity, gestational age, labour type, and socioeconomic status did not show statistically significant associations, hypertension was identified as a major contributor to PPH. These findings underscore the need for vigilant monitoring of hypertensive patients and the development of standardized labour protocols irrespective of delivery method. Improving labour ward preparedness, ensuring active management of the third stage of labour, and early identification of high-risk pregnancies can significantly reduce the burden of PPH. Future research with larger sample sizes and inclusion of factors such as birth weight, duration of labour stages, and care provider experience would provide a more comprehensive understanding of the determinants of postpartum haemorrhage in our setting.

Authors Contribution

Conceptualization: MT
Methodology: MT, SR, SJ, CA, IR
Formal analysis: SR, CA, BSH, IR
Writing review and editing: MT, CA, IR

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

REFERENCES

[1] Tiruneh B, Fooladi E, McLelland G, Plummer V. Incidence, Mortality, and Factors Associated with Primary Postpartum Hemorrhage Following in-Hospital Births in Northwest Ethiopia. PLOS One. 2022 Apr; 17(4): e0266345. doi: 10.1371/journal.pone.0266345.

[2] Gustiani R and Kartini F. Factors Affecting Postpartum Haemorrhage on Postpartum Mother. Placentum: Jurnal Ilmiah Kesehatan dan Aplikasinya. 2023; 11(1): 13-22. doi: 10.20961/placentum.v11i1.55528.

[3] Nigussie J, Girma B, Molla A, Tamir T, Tilahun R. Magnitude of Postpartum Hemorrhage and Its Associated Factors in Ethiopia: A Systematic Review and Meta-Analysis. Reproductive Health. 2022 Mar; 19(1): 63. doi: 10.1186/s12978-022-01360-7.

[4] Kalu FA and Chukwurah JN. Midwives' Experiences of Reducing Maternal Morbidity and Mortality from Postpartum Haemorrhage (PPH) In Eastern Nigeria. BioMed Central Pregnancy and Childbirth. 2022 Jun; 22(1): 474. doi: 10.1186/s12884-022-04804-x.

[5] Liu CN, Yu FB, Xu YZ, Li JS, Guan ZH, Sun MN *et al.* Prevalence and Risk Factors of Severe Postpartum Hemorrhage: A Retrospective Cohort Study. BioMed Central Pregnancy and Childbirth. 2021 Apr; 21(1): 332. doi: 10.1186/s12884-021-03818-1.

[6] Majeed S, Tahira T, Younis Z, Usman S. Maternal Mortality and Morbidity Associated with Primary PPH in Patients at Allied Hospital Faisalabad. Indus Journal of Bioscience Research. 2025 Apr; 3(4): 38-42. doi: 10.70749/ijbr.v3i4.820.

[7] Zeng Y, Zhang Y, Zhen M, Lao L, Ma Y, Liu L *et al.* Side-Effects of Oxytocin in Postpartum Hemorrhage: A Systematic Review and Meta-Analysis. American Journal of Translational Research. 2022 Mar; 14(3): 1934.

[8] Jones AJ, Federspiel JJ, Eke AC. Preventing Postpartum Hemorrhage with Combined Therapy Rather Than Oxytocin Alone. American Journal of Obstetrics and Gynaecology Maternal Fetal Medicine. 2023 Feb; 5(2): 100731. doi: 10.1016/j.ajogmf.2022.100731.

[9] Jamil S, Majeed T, Naureen R, Sheraz MA, Sikandar MZ. Incidence of Postpartum Hemorrhage in Induced Versus Normal Labour. Pakistan Journal of Medical and Health Sciences. 2023; 17(08): 57-57. doi: 10.53350/pjmhs202317857.

[10] Khadim I, Hussain N, Sahar N, Khalid R. Effect of Nursing Care Practices Based on Clinical Interventions on the Incidence of Primary Post-Partum Hemorrhage in Females Undergoing Spontaneous Vaginal Delivery: Nursing Care Practices Based on Clinical Interventions. Pakistan Journal of Health Sciences. 2023 Apr: 161-5. doi: 10.54393/pjhs.v4i04.657.

[11] 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. The Professional Medical

DOI: https://doi.org/10.54393/pjhs.v6i7.3268

Journal. 2023 Oct; 30(10): 1264-9. doi: 10.29309/TPMJ/2023.30.10.7669.

[12] Bernitz S, Betran AP, Gunnes N, Zhang J, Blix E, Øian P *et al.* Association of Oxytocin Augmentation and Duration of Labour with Postpartum Haemorrhage: A Cohort Study of Nulliparous Women. Midwifery. 2023 Aug; 123: 103705. doi: 10.1016/j.midw.2023.103705.

[13] Cheng TS, Zahir F, Solomi C, Verma A, Rao S, Choudhury SS *et al.* Does Induction or Augmentation of Labor Increase the Risk of Postpartum Hemorrhage in Pregnant Women with Anaemia? A Multicenter Prospective Cohort Study in India. International Journal of Gynaecology and Obstetrics. 2025 Apr; 169(1): 299-309. doi: 10.1002/ijgo.16008.

[14] Kumar B, Kumari S, Hughes S, Savill S. Prospective cohort study of induction of labor: Indications, outcome and postpartum hemorrhage. European Journal of Midwifery. 2021 Nov; 5: 53. doi: 10.18332/ejm/142782.

[15] Mentzoni CT, Klungsøyr K, Engjom HM. Trends in severe postpartum haemorrhage among nulliparous women with spontaneous onset of labour: A population-based cohort study. An International Journal of Obstetrics and Gynaecology. 2024 Oct; 131(11): 1475-83. doi: 10.1111/1471-0528.17838.

[16] Khurshid S, Khurshid M, Khan F. Incidence of Primary Postpartum Haemorrhage in Induced Versus Augmented Labour. A One Year Review at FMH. 2023.

[17] Zhu H, Lu D, Branch DW, Troendle J, Tang Y, Bernitz S *et al.* Oxytocin Is Not Associated with Postpartum Hemorrhage in Labor Augmentation in A Retrospective Cohort Study in the United States. American Journal of Obstetrics and Gynaecology. 2024 Feb; 230(2): 247-e1. doi: 10.1016/j.ajog.2023.07.054.

[18] Pettersen S, Falk RS, Vangen S, Nyfløt LT. Exploring Trends of Severe Postpartum Haemorrhage: A Hospital-Based Study. BioMed Central Pregnancy and Childbirth. 2023 May; 23(1): 363. doi: 10.1186/s12884-023-05702-6.

[19] Girault A, Blondel B, Fraser W, Goffinet F, Le Ray C. Maternal and Neonatal Consequences of Early Augmentation of Labor Among Women with Spontaneous Onset of Labor: A National Population-Based Study. Birth. 2025 Jun; 52(2): 308-19. doi: 10.1111/birt.12883.

[20] Mubasher S, Syed S, Malik SN, Ishtiaq A, Bilqis H, Noreen H. Comparison of Frequency of Postpartum Hemorrhage in Spontaneous versus Prostaglandin Induced Labour at Term Gestation. Life and Science. 2024 Aug; 5(3): 08-. doi: 10.37185/LnS.1.1.618.

[21] Ladfors LV, Liu X, Sandström A, Lundborg L, Butwick AJ, Muraca GM *et al.* Risk of Postpartum Hemorrhage with Increasing First Stage Labor Duration. Scientific Reports. 2024 Sep; 14(1): 22152. doi: 10.1038/s41598-024-72963-2.

[22] Pacagnella RC, Borovac-Pinheiro A, Silveira C, Siani Morais S, Argenton JL, Souza JP *et al.* The Golden Hour for Postpartum Hemorrhage: Results from A Prospective Cohort Study. International Journal of Gynaecology and Obstetrics. 2022 Mar; 156(3): 450-8. doi: 10.1002/ijgo.13823.

[23] Thies-Lagergren L, Kvist LJ, Gottvall K, Jangsten E. A Swedish Register-Based Study Exploring Primary Postpartum Hemorrhage in 405 936 Full-Term Vaginal Births Between 2005 and 2015. European Journal of Obstetrics and Gynaecology and Reproductive Biology. 2021 Mar; 258: 184-8. doi: 10.1016/j.ejogrb.2020.12.018.