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Original Research Article

Comparison of risk factors of postpartum hemorrhage among normal versus cesarean delivery cases at a secondary care center in Naogaon

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ABSTRACT

Background: Postpartum hemorrhage (PPH) involves excessive blood loss of 500 mL or more after vaginal delivery (NVD) or 1,000 mL or more after cesarean section within 24 hours postpartum. PPH significantly contributes to maternal mortality worldwide. Understanding the diverse effects of distinct risk factors is essential for effective mitigation. This study aimed to compare the risk factors of PPH among normal versus cesarean delivery (CD) cases at 250 bed modernized general hospital.

Methods: Conducted at the department of obstetrics and gynaecology, 250 bed modernized general hospital, Naogaon, Bangladesh, this prospective study investigated PPH in 100 women from 01 July, 2022 to 30 June, 2023. Participants were divided into two equal groups in number: Group A (normal vaginal delivery) and group B (caesarean-section delivery). Data collection and analysis were performed using MS office.

Results: In terms of risk factors, group A saw 4% maternal ages <19 and >40, while group B had 4% and 8% respectively. Artificial reproductive technique use was 2% in group A and 4% in group B. Weight gain >15.0 kg during pregnancy was 8% in group A and notably higher at 20% in group B. Gestational age <36 weeks affected 14% in group A and 8% in group B.

Conclusions: In normal vaginal deliveries, maternal age <19 years, gestational age <36 weeks, labor induction/augmentation by oxytocin and neonatal birth weight <2499 gm are prominent risk factors. For cesarean-section deliveries, maternal age >40, weight gain >15.0 kg, pre-eclampsia, and neonatal birth weight >3500 gm also pose significant risks.

Keywords: Risk factors, PPH, Normal delivery, Cesarean section

INTRODUCTION

Postpartum hemorrhage (PPH) remains a critical obstetric emergency, contributing significantly to maternal mortality rates across both developing and developed nations.[1] It not only results in maternal deaths but also leads to considerable morbidity.[3] According to WHO statistics, PPH is responsible for around 60% of maternal deaths in developing countries, resulting in over 100,000 maternal fatalities globally each year.[3] PPH is defined as blood loss of 500 mL or more in the 24 hours following birth.[4] Most women giving birth are young and healthy and able to compensate for a small to moderate PPH, making a complete recovery. PPH is an important cause of maternal death and severe maternal morbidity.[5-7] Compared to vaginal delivery, women undergoing CD incur the highest risk of PPH and hemorrhage-related morbidity.[8] Moreover, evidence suggests that PPH during CD occurs more frequently. In the United States, between 1994 and 2006, the ratio of atonic PPH increased by 160% in women undergoing CD after induction and by 130% in women undergoing non-induced CD.[9] The International PPH Collaborative group, consisting of clinical epidemiologists, emphasizes the need for studies with

clinically rich data to better understand preventable and relevant risk factors associated with PPH.[10] The society of obstetricians and gynaecologists of Canada has published guidelines on preventing and managing these complications.[11] They categorize PPH causes into the "four Ts": tone, tissue, trauma, and thrombin. Atonic bleeding stands out as the most significant factor in PPH. Risk factors for PPH encompass various antepartum and intrapartum conditions, including a history of PPH, multiple pregnancies, fetal macrosomia, primigravida, grand multiparity, older age, preterm births, genital tract injuries, lack of oxytocin use for PPH prophylaxis, labor induction, CD , and intrauterine fetal deaths.[12,13] A separate study identified maternal age <19 and >40 years and the use of artificial reproductive techniques as risk factors for PPH.[14] Additionally, pregnancy-induced hypertension was identified as a risk factor in another study.[15] The current study aims to compare the risk factors for PPH between normal and CD cases at 250 bed modernized general hospital.

METHODS

This was a prospective observational study that was conducted at the department of obstetrics and gynaecology, 250 bed modernized general hospital, Naogaon, Bangladesh from 01 July, 2022 to 30 June, 2023. It aimed to investigate risk factors of PPH in 100 women. Properly written consent was taken from all the participants before data collection. The participants were categorized into two groups: group A comprising 50 women who had a normal delivery and group B with 50 women who underwent a caesarean-section delivery. Demographic and clinical data including age, parity, gestation period, PPH risk factors, delivery mode, and management were recorded. Exclusion criteria encompassed cases of stillbirths, multiple pregnancies, and missing primary outcome data on blood loss. Data were collected by using a predesigned questionnaire. All data were processed, analyzed and disseminated by using MS office tools.

RESULTS

In group A, which consisted of participants who underwent a normal vaginal delivery, 76% (n=38) experienced blood loss of less than 499 ml, indicating a relatively minor degree of hemorrhage. A smaller proportion, 16% (n=8), had blood loss ranging from 500 to 1000 ml, signifying a moderate level of bleeding. A minority, 6% (n=3), encountered blood loss in the range of 1000 to 1500 ml, while only 1% (n=1) had a significant blood loss exceeding 1500 ml. In group B, comprising cases who underwent a cesarean-section delivery, the blood loss distribution exhibited some variations. Among this group, 64% (n=32) had blood loss below 499 ml, indicating a lower percentage compared to group A. Notably, 24% (n=12) of group B participants experienced blood loss within the range of 500 to 1000 ml, signifying a substantial increase in this category compared to group A. Additionally, 8% (n=4) encountered blood loss ranging from 1000 to 1500 ml, and 4% (n=2) had blood loss exceeding 1500 ml. In group A, which encompassed participants with normal vaginal deliveries, 70% (n=35) fell into the parity range of 1-2, indicating that the majority of these individuals had experienced one to two previous pregnancies. A smaller proportion, 24% (n=12), belonged to the 3-4 parity category, signifying participants who had undergone three to four pregnancies before the current one. A mere 6% (n=3) were classified as having a parity of greater than four, indicating a history of more than four pregnancies. Group B, consisting of participants who underwent cesarean-section deliveries, showcased a somewhat similar distribution with slight variations. Here, 72% (n=36) of participants fell into the parity range of 1-2, aligning closely with the parity distribution in group A. In the 3-4 parity category, 28% (n=14) of group B participants were represented, which also closely mirrors the proportion in group A. However, interestingly, no participants in group B reported a parity greater than four, thus reflecting a distinct difference from the distribution in group A. In group A, 16% (n=8) reported a history of previous PPH, indicating that a minority of participants had experienced PPH in their past pregnancies. The majority, 84% (n=42), answered negatively, indicating no history of PPH in their previous pregnancies. In group B, 22% (n=11) had a history of previous PPH. This indicates that a higher proportion of individuals in this group had experienced PPH in their past pregnancies compared to group A. Conversely, 78% (n=39) responded negatively, implying that they had not previously experienced PPH. Upon thorough examination of risk factors for PPH across the two groups, several noteworthy observations emerged. In group A, maternal ages falling below 19 years and exceeding 40 years accounted for 4% each, whereas in group B, these respective figures were 4% and 8%. The application of artificial reproductive techniques was identified in 2% of cases within group A, contrasting with 4% in group B. Significant differences in weight gain during pregnancy were evident between the groups, with 8% of group A participants experiencing a weight gain exceeding 15.0 kg, while this proportion was notably higher at 20% within group B. Gestational age at delivery revealed further disparities, with 14% of group A pregnancies culminating in deliveries before the 36-week mark, in contrast to 8% within group B. Pre-eclampsia, a crucial concern, was recorded in 6% of group A cases and slightly higher at 10% in group B. The administration of labor induction or augmentation through oxytocin was observed in 14% of group A and 12% of group B, underlining variations in medical interventions. After childbirth, the distribution of birth weights demonstrated intriguing trends. Birth weights less than 2499 gm were more prevalent in group A, constituting 16% of cases compared to 14% in group B. Conversely, birth weights exceeding 3500 gm, indicative of larger newborns, were notably rarer in group A at 14%, while this figure reached 18% in group B. This detailed analysis underscores the multifaceted nature of risk factors influencing PPH in these distinct groups.

Table 1: Blood loss status of participants in both groups, (n=100).

Blood loss (ml)	Group A, (n=50)		Group B, (n=50)	
	N	%	N	%
<499	38	76	32	64
500-1000	8	16	12	24
1000-1500	3	6	4	8
>1500	1	1	2	4

Table 2: Parity distribution between the groups, (n=100).

Parity	Group A, (n=50)		Group B, (n=50)	
	N	%	N	%
1-2	35	70	36	72
3-4	12	24	14	28
>4	3	6	0	0

Table 3: History of previous PPH, (n=100)

History of PPH	Group A, (n=50)		Group B, (n-50)	
	N	%	N	%
Yes	8	16	11	22
No	42	84	39	78

Table 4: Risk factors of postpartum hemorrhage between the groups, (n=100)

Variables	Group A, (n=50)		Group B, (n=50)	
	N	%	N	%
Age at birth				
Under 19	2	4	2	4
Over 40	2	4	4	8
Artificial reproductive technique				
Used	1	2	2	4
Weight gain during pregnancy (Kg)				
Over 15.0	4	8	10	20
Gestational age at delivery (weeks)				
Before 36/6	7	14	4	8
Pregnancy-induced hypertension				
Present	3	6	5	10
Labor induction/ augmentation by oxytocin				
Used	7	14	6	12
Neonatal birth weight (gm)				
Less 2499	8	16	7	14
Over 3500	7	14	9	18

DISCUSSION

This study aimed to compare the risk factors of PPH among normal versus CD cases at 250 bed modernized general hospital. In group A, where participants had normal vaginal deliveries, 76% (n=38) experienced blood loss of less than 499 ml, indicating minor hemorrhage. A smaller portion, 16% (n=8), had blood loss between 500 and 1000 ml, representing moderate bleeding. A minority, 6% (n=3), encountered blood loss from 1000 to 1500 ml, while only 1% (n=1) had significant blood loss exceeding 1500 ml. In group B, consisting of cesarean-section deliveries, 64% (n=32) had blood loss under 499 ml, with 24% (n=12) experiencing 500-1000 ml blood loss, showing differences compared to group A. These findings were comparable with the findings of another study but dissimilar with some other studies.[14,16,17] In group A, involving participants with normal vaginal deliveries, 70% (n=35) had a parity of 1-2, indicating a majority with one to two previous pregnancies. A smaller proportion, 24% (n=12), had a parity of 3-4, denoting those with three to four prior pregnancies. Only 6% (n=3) had a parity greater than four, reflecting more than four pregnancies. In group B, consisting of cesarean-section deliveries, 72% (n=36) had a parity of 1-2, closely aligning with group A. For the 3-4 parity category, 28% (n=14) of group B participants were represented, which closely mirrors the proportion in group A. Many studies report data that shows that parity predisposes to rupture of the uterus and causes higher blood loss.[18,19] Regarding the history of previous PPH among all participants, we observed that in (Group A), 16% of mothers had a history of previous PPH. Conversely, in group B, 22% had experienced previous PPH. Women with a history of uterine atony during their prior delivery were almost five times more prone to developing PPH than those with normal contractions after childbirth. This observation aligns with previous findings reported in various contexts.[20,21] In this study, regarding risk factors, maternal ages <19 and >40 were each observed in 4% of group A, and 4% and 8% respectively in group B. Artificial reproductive technique usage stood at 2% for group A and 4% for group B. Weight gain during pregnancy >15.0 kg was observed in 8% of group A and notably higher at 20% in group B. Gestational age <36 weeks was present in 14% of group A and 8% of group B. Pre-eclampsia was noted in 6% of group A and 10% of group B. Labor induction/augmentation by oxytocin was seen in 14% of group A and 12% of group B. Following childbirth, birth weight <2499 gm was more frequent in group A (16%) compared to group B (14%), while birth weight >3500 gm (14%) was less common than in group B (18%). Besides the study conducted by Fukami et al 14 in many studies, those mentioned factors were described as the potential risk factors for normal vaginal as well as cesarean-section delivery.[22-24] All the findings of this current study may be helpful in further similar studies.

Limitations

This study was conducted at a single center with a limited sample size. Additionally, the study was carried out within a brief timeframe, potentially limiting its generalizability to the broader context of the entire country.

CONCLUSION

In the context of normal vaginal deliveries, several significant risk factors contributing to PPH have been identified. Maternal age below 19 years emerges as a prominent risk factor, associated with an elevated likelihood of PPH occurrence. Additionally, gestational

age at delivery below 36 weeks, indicating preterm births, is linked to an increased risk of PPH. The administration of labor induction or augmentation through oxytocin is also associated with a heightened PPH risk in normal vaginal deliveries. Furthermore, low neonatal birth weight below 2499 gm is recognized as a significant risk factor contributing to PPH incidence within this group. On the other hand, in the context of cesarean-section deliveries, distinct risk factors take precedence in predicting PPH likelihood. Maternal age exceeding 40 years is identified as a key risk factor, indicating that advanced maternal age contributes to a heightened risk of PPH during cesarean-section deliveries. Excessive pregnancy weight gain, exceeding 15.0 kg, is associated with an elevated PPH risk in cesarean-section cases. Pre-eclampsia, characterized by elevated blood pressure during pregnancy, has also been demonstrated as a notable risk factor for PPH in cesarean-section deliveries. Additionally, neonatal birth weight exceeding 3500 gm, suggesting larger newborns, is another significant risk factor for PPH in this delivery mode. These findings underscore the intricate interplay of risk factors contributing to PPH, with varying levels of importance depending on the delivery mode. Recognizing and comprehending these distinct risk factors is pivotal for devising effective preventive strategies and optimal management of PPH in diverse clinical scenarios.

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