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ORIGINAL ARTICLE

A Retrospective Case-Control Study on the Risk Factors of Postpartum Hemorrhage

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ABSTRACT

Aim: To determine the risk factors for postpartum hemorrhage**.**
Study design:A retrospective case-control study
Place and duration: This study was conducted at Bolan Medical College and Hospital Quetta from January 2021 to January 2022.
Methodology: A total of 115 patients with PPH were identified in the given data.A case was categorized based on blood loss of more than 1500 mL or needing the transfusion of blood due to excessive postpartum blood loss. According to the exclusion criteria, those women who were transfused blood due to anemia were not included in the present study. A total of 225 cases were randomly chosen as controls. Those women did not report having PPH.
Results: According to the data collected in our study, a total of 4695 babies were delivered in the given duration of time. Out of those, 115 were identified as cases and 225 were considered as random controls. The frequency of PPH was 2.45%. The commonest etiology of PPH was atony of the uterus (60%) and complications related to the placenta (36%). The risk factors determined to cause PPH was a positive history of PPH, anticoagulant drugs, anemia, severe pre-eclampsia, fibromas in the uterus, multiple pregnancies, and the use of assisted reproduction technologies.
Conclusion: Patients having a positive history of PPH are most likely to develop severe PPH. It is the most significant risk factor. The most significant risk factor to cause severe PPH was a positive history of PPH, anticoagulation drugs, severe pre-eclampsia, anemia, multiple pregnancies, and uterine fibromas
Keywords: Case-control study, postpartum hemorrhage, Risk factors, High-risk, Obstetric interventions

INTRODUCTION

PPH is defined as the loss of blood after giving birth. It usually occurs in the first 24 hours of delivery. However, it can occur up to twelve weeks after delivery. About 5% of the women experience PPH. Common reasons for PPH are uterine atony, uterine inversion, uterine rupture, placental complications, labor inducers, and lacerations [1]. Severe PPH is one of the most significant contributors to maternal morbidity and mortality. It accounts for about 50 to 75% of all cases of PPH [2]. This is why PPH is considered an indicator of the quality of obstetric patients' treatment. It has been noticed in various studies that the prevalence of PPH is more in countries of high income [3-5].

The increasing frequency of PPH can be explained by the increase in the rate of induction of labor, cesarean section, and augmented labor [6]. The findings of the study of Kramer et al suggests that pregnant patients having one of the mentioned intervention, need close monitoring for PPH in the postpartum phase. Other risk factors are multiple pregnancies, chorioamnionitis, and operative delivery. Studies show that severe PPH can also be seen without any known risk factors [7]. The primary aim of the present study is the evaluation of the risk factors of severe PPH.

METHODOLOGY

The present study is a retrospective case-control study. Th permission was taken from the ethical review committee of the institute. A total of 115 patients with PPH were identified in the given data. The criteria of severe PPH were a blood loss of more than 1500 mL or the need for transfusion of blood due to excessive blood loss during delivery. According to the exclusion criteria, those women who were transfused blood due to anemia were not included in the present study. A total of 225 cases were randomly chosen as controls. Those women did not report having PPH.

The risk factors and causes of PPH were distinguished in the present study. The causes identified for PPH were tone, tissue, trauma, and thrombin. For placental complications, pathology reports and medical records were conferred. The risk factors for PPH included in the present study were ethnicity, marital status, uterine abnormalities (septated uterus, uterus didelphys, unicornuate uterus, and bicornuate uterus), history of uterine surgery, previous PPH, uterine fibromas, and previous C-section. The parameters related to pregnancy considered in this study were maternal age, BMI before pregnancy, anemia at the beginning of pregnancy, any assisted technology used for conception, multiple pregnancies, use of anticoagulant drugs, gestational diabetes, premature rupture of membrane, and pre-eclampsia. Intrapartum factors that were included in the study were maternal body temperature during delivery, induction of labor, mode of delivery, augmentation of labor by oxytocin, and birth weight of the newborn. Birth weight of the infant, BMI of mother, and age of mother were taken as the continuous variables.

In the present study, it was hypothesized that women above the age of 35 years have 1.4 folds more risk of severe PPH as compared to women in the younger age group. It was also assumed that the risk of severe PPH has increased 1.6 folds in those with induced labor. The statistical data were analyzed by IBM SPSS version 26.

RESULTS

A data of 4695 patients were initially analyzed in the present study. It was considered the source population. Out of those, 115 (2.45%) were said to have PPH because they had a blood transfusion or blood loss of more than 1500 mL. Table 1 gives the identified causes of PPH in those patients. The most common cause of severe PPH was uterine atony (53.9%). Retained tissue was present in 34.78% of the patients. The study population was 115 patients and random controls were 225. Potential risk factors are given in table 2. The median values of BMI, infant birth weight, and maternal age were similar in the control and case groups. The maternal age in the case group was 32 (28-37) and it was 32 (29-36) in the control group. The BMI was 22.6 (20.6-25.8) in the control group and it was 22.8 (20.7-25.9) in the case group. Similarly, it was 3542 grams (3065-3943) in the case group and 3498 grams (3150-3845) in the control group.

Table 1: Causes of severe PPH (n=115)

Causes	Frequency	Percentage
Tone	72	62.6
Uterine atony	62	53.9
Abruption of placenta	8	6.95
Uterine inversion	2	1.73
Tissue	40	34.78
Abnormal placenta	5	4.34
Retained placenta tissue	6	5.21
Retained placenta	29	25.22
Trauma	21	18.3
Surgical trauma	5	4.35
Birth-canal trauma	14	13.04
Uterine rupture	2	1.73
Thrombin	2	1.74
Pre-existing coagulation disorder	1	0.87
DIC	1	0.87

The analysis showed that severe PPH was more common in the primiparous women, who had a history of PPH, previous surgical intervention in the uterus, history of any uterine abnormality, IVF/ICSI augmented pregnancies, multiple gestations, severe pre-eclampsia, and anemia. Severe PPH was seen more commonly in the women with delivery and intrapartum characteristics such as instrumental delivery, C-section in labor, induced labor, oxytocin augmented labor, PROM, fever during delivery, and higher birth weight (≥4500 g)

Table 2: Clinical profiles of the patients in the case group versus. The control group

Clinical feature	Case group Severe PPH (n=115)	Control group (n=225)	OR	95% CI	p-value
Age (years)					
15-19	1 (0.87%)	3 (1.33%)	2.3	0.93-5.32	0.063
20-29	45 (39.13%)	84 (37.33%)	1.1	0.8-1.6	0.496
30-39	52 (45.22%)	111 (49.33%)	1.2	0.9-1.7	0.063
≥40	17 (14.78%)	27 (12%)	1.4	0.9-2.2	0.078
Parity					
0	66 (57.39%)	112 (49.77%)	1.5	1.3-1.8	<0.001
1	31 (26.96%)	65 (28.88%)	1.04	0.8-1.3	0.734
≥2	10 (8.69%)	42 (18.66%)	1.4	1.1-2.1	0.043
BMI (kg/m^2)					
<18.5	26 (22.60%)	28 (24.35%)	1.1	0.7-1.9	0.653
18.5-24.9	62 (53.19%)	102 (45.33%)	1.08	0.9-1.3	0.621
25-29.9	14 (12.17%)	65 (28.88%)	1.1	0.8-1.5	0.287
30.0-34.9	8 (6.96%)	15 (6.67%)	1.6	0.8-2.4	0.165
35.0-39.9	4 (3.48%)	10 (4.44%)	1.4	0.4-2.5	0.962
≥40	1 (0.86%)	5 (2.22%)	1.09	0.5-0.9	0.968
Pre-pregnancy conditions					
Uterine surgery	2 (1.74%)	1 (0.44%)	3.3	1.6-7.1	0.001
Uterine anomaly	2 (1.74%)	2 (0.89%)	2.4	1.5-5.1	0.020
Previous severe PPH	10 (8.69%)	25 (11.11%)	6.4	3.9-10.6	<0.001
Previous C-section	18 (15.65%)	3 (1.33%)	1.1	0.8-1.4	0.362
Obstetrics factors					
IVF/ICSI	16 (13.91%)	8 (3.56%)	2.9	2.1-3.9	<0.001
Gestational diabetes mellitus	14 (12.17%)	6 (2.67%)	1.5	1.1-2.3	0.027
Multiple pregnancies					
Anemia (Hb ≤ 9.0 g/dL)	12 (10.43%)	5 (2.22%)	3.7	2.6-5.9	<0.001
Uterine fibroma	9 (7.82%)	6 (2.67%)	4.1	2.7-6.1	<0.001
Anticoagulant medication	5 (4.3%)	4 (1.78%)	2.7	1.7-4.1	<0.001
Severe pre-eclampsia	5 (4.3%)	6 (2.67%)	4.6	2.8-7.7	<0.001
Polyhydramnios	5 (4.3%)	5 (2.22%)	3.5	2.4-7.7	<0.001
	3 (2.61%)	3 (1.33%)	2.6	1.2-5.5	0.013
Obstetric Conditions					
Mode of Delivery					
Spontaneous vaginal deliver	55 (47.82%)	125 (55.56%)	2.6	1.8-2.4	0.643
Instrumental vaginal delivery					
Emergency C-section during labor	22 (19.13%)	52 (23.11%)	2.2	1.8-2.7	<0.001
Elective C-section					
	25 (21.74%)	26 (11.56%)	2.7	2.2-3.3	<0.001
	13 (11.30%)	22 (9.78%)	1.2	0.9-1.6	0.073
PROM	14 (12.17%)	25 (11.11%)	1.5	1.1-1.9	0.001
Labor induction	25 (21.73%)	40 (17.77%)	2.01	1.7-2.3	<0.001
Labor augmentation	65 (56.52%)	71 (31.55%)	1.9	1.6-2.2	<0.001
Fever in labor	9 (7.8%)	5 (2.22%)	2.5	1.7-2.3	<0.001
Birth weight of more than 4500 g	7 (6.08%)	5 (2.22%)	1.7	1.2-2.6	0.004

DISCUSSION

The present case-control study determined the risk factors causing severe PPH. The strongest risk factor identified in the present study is a positive history of PPH. They had nine times more risk of development of severe PPH. The study by Ford et al reported that there is a 28% chance of recurrence of PPH, however, the rate of recurrence in the registry was 18%. That is because the data in the registries is different from the research-based data [8]. However, the study of Oberg et al suggests that the recurrence can be due to genetic and environmental factors [9]. Another study by Oberg et al study described the maternal genetic factors responsible for the recurrence of PPH [10].

The guidelines related to obstetric patients in Norway recommend discontinuing anticoagulant drugs at the time of onset of the labor or at least 12 hours before an elective cesarean section delivery. The findings of the present study coincide with the Swedish study [11]. The risk of development of PPH was three times more in the patients taking anticoagulant medications during

their pregnancy. Furthermore, some studies are not suggestive of the same results [12]. In the present study, obstetric factors such as instrumental delivery, augmented labor, induction of labor, and elective and emergency cesarean section were strongly associated with PPH. These findings are similar to the findings of Al-Zirqi et al [13]. Desensitization of the oxytocin receptors can explain the reason for the association of PPH with augmented labor [14]. The study of Belghiti et al suggests that the association of oxytocin with PPH is related to the dose of oxytocin and an evidence-based regimen should be used for augmentation of labor through oxytocin [15]. Placental problems were identified as one of the potential risk factors to cause severe PPH. The study by Anger et al finds that 10% of the PPH cases were identified with abnormal placentation [16].

CONCLUSION

The most significant risk factor to cause severe PPH was a positive history of PPH, anticoagulation drugs, severe pre-eclampsia, anemia, multiple pregnancies, and uterine fibromas. Taking these factors into consideration and monitoring can lower the risk of severe PPH. Obstetric risk factors responsible for severe PPH identified in the present study are an augmentation of labor, labor induction, use of IVF/ICSI, and PROM.

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