DOI - 10.21276/obgyn.2023.9.2.23 *ISSN Print – 2454-2334; ISSN Online – 2454-2342*

RESEARCH ARTICLE

Prevalence and outcome of primary postpartum haemorrhage in a tertiary care hospital: a hospital record based study

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ABSTRACT

Background: Postpartum haemorrhage (PPH) is one of the well known reasons for maternal morbidity and mortality worldwide. Primary PPH occurs within 24 hours postpartum and secondary PPH between 24 hours and six weeks postpartum. The most common obstetric haemorrhage is primary PPH. **Objectives:** This study was aimed to estimate the prevalence and outcome of PPH in a tertiary care hospital. **Methodology:** The present study was a retrospective study that included 225 mothers diagnosed with PPH. Data was collected from medical records available in the hospital. Prevalence and outcome of postpartum hemorrhage was the primary outcome, and the obstetric score, mode of delivery, and etiology were considered as secondary outcomes. **Results:** The prevalence of postpartum hemorrhage was 0.73%. The etiologies were found to be atonic uterus (79.11%), traumatic (19.56%), and tissue/retained bits (1.33%), and the risk factors were induced labor 16%, followed by prolonged labor 11.1%, preeclampsia 4.4%. 91.11% of patients were treated medically, and 8.88% were treated surgically. The percentage of patients who were multigravida and underwent surgical management was 65%. 221 (98.22%) participants survived, and four (1.78%) participants died. The cause of death was shock (75.00%) and cardiac arrest (25%). **Conclusion:** In this study, a prevalence of 0.73% was noted for primary PPH. Uterine atony was the most common etiology causing PPH. The most frequently encountered risk factors were induced labor. The majority of the patients underwent conservative management. Shock was the common cause of death due to PPH.

Keywords: Postpartum hemorrhage, maternal mortality, uterine atony, risk factor, hysterectomy.

One of the well known reasons for maternal morbidity and mortality is postpartum haemorrhage (PPH), which may occur in 1-5% of deliveries worldwide. PPH is defined as the blood loss sufficient to cause hypovolemia, a 10% drop in the hematocrit, or requiring transfusion of blood products (regardless of route of delivery) by the American College of Obstetricians and Gynaecologist (ACOG) [1]. PPH with a blood loss of more than one litre is seen in about 12-13% of all deliveries, while hazardous haemorrhage occurs in one in 1000 deliveries. It fundamentally prompts anaemia, infection, lactational failure, blood transfusion, and psychological morbidity [2].

The most common kind of obstetric haemorrhage is mainly primary PPH, which occurs within 24 hours postpartum. Secondary PPH is more uncommon, occurring between 24 hours and six weeks postpartum, mainly due to infection secondary to retained placental products [3]. Postpartum bleeding is classified according to its site. Hence primary PPH is further classified as placental or extraplacental bleeding [4].

The most widely recognized reason for PPH is uterine atony, i.e., failure of the uterus to contract sufficiently after birth, liable for 70–90% of all PPH cases [5-7]. In numerous studies, it was uncovered that the primary driver of PPH is

Received: 11th June 2021, **Peer review completed: 10th July 2021**, **Accepted: 10th October 2021**.

Ramani S, Vijaya B. Prevalence and outcome of primary postpartum haemorrhage in a tertiary care hospital: a hospital record based study. The New Indian Journal of OBGYN. 2023; 9(2): 308 - 13.

uterine atony followed by vaginal hematoma, cervical or vaginal tear, adherent placenta, uterine angle extension, and retained placenta. A brief acknowledgment followed by uterine massage and administration of uterotonic agents often helps in the cessation of bleeding in uterine atony [8].

The genital tract may damage spontaneously or through manipulations done during labor. Injury may likewise happen following prolonged or vigorous labor, if the patient has relative or absolute cephalopelvic disproportion or if labor induction is done by stimulating the uterus with oxytocin or prostaglandins. Patients with previous cesarean delivery scars often report uterine rupture. Routine transvaginal palpation of such scars is not at this point suggested. The presence of the clotting system abnormalities, such as familial hypofibrinogenemia and von Willebrand disease, should be considered [8]. Prolonged third stage of labor due to abnormal placentation like placenta accreta or increta, perineal lacerations, and episiotomy are other risk factors for PPH [9].

To forestall these complications, a coordinated stepwise protocol should be followed. One of the approaches to prevent PPH is active management of the third stage of labor (AMTSL), often considered as the "gold standard" to diminish the frequency of PPH. It is a combination of uterotonic administration (preferable oxytocin) immediately upon delivery of the baby and gentle, controlled cord traction with uterine counter traction when the uterus is well contracted (Brandt-Andrews maneuver) [2].

Since primary PPH has been identified as one of the major reasons causing maternal mortality, the present study intends to estimate the prevalence and outcome of PPH in a tertiary care hospital in Tamil Nadu.

Objectives:

1. To estimate the prevalence of PPH.
2. To analyze the maternal outcome and the cause of death in PPH patients.
3. To analyze risk factors and etiologies of PPH.
4. To determine the association of clinical parameters with PPH management options practiced in our institute.

Methodology

The present study was a descriptive observational hospital record-based study. The study population was all mothers who were diagnosed with PPH from 2015 to 2019 in Government Head Quarters Hospital, Dindigul, Tamil Nadu. Blood loss of 500ml or more in vaginal delivery and 1000ml or more following cesarean section was considered as a diagnosed case for PPH.

Sample size was calculated assuming the proportion of postpartum hemorrhage as 16.6% as per the study by Biruk Assefa Kebede et al [10]. The other parameters considered for sample size calculation were 5% absolute precision and 95% confidence level. The following formula was used for sample size as per the study by Daniel WW et al [11].

Where n = Sample size

Z= Z statistic for a level of confidence level= 1.960

P = Expected prevalence/proportion of outcome= 0.166

d = Precision= 0.05

The required sample size as per the above mentioned calculation was 213. To account for a non-participation rate of about 5%, another 12 subjects will be added to the sample size. Hence the final required sample size would be 225.

Data were collected from the medical record section of Government Head Quarters Hospital, Dindigul, Tamil Nadu. A total of 30459 deliveries (both vaginal delivery and cesarean section) were reported from 2015 to 2019. Out of that, mothers who had PPH were identified according to inclusion criteria; 225 mothers out of 30459 were identified as PPH patients. Data were collected for records for an obstetric score, mode of delivery, etiology, blood transfusion, mortality.

The study was approved by the institutional review board and the ethics committee of the hospital.

The mortality and cause of death were considered as the primary outcome variable. Age, mode of delivery, etiology, obstetric score, blood transfusion, etc.,were considered as other study relevant variables. Management (medical v/s surgical) was considered as an explanatory variable. All quantitative variables were checked for normal distribution within each category of an explanatory variable by using visual inspection of histograms and normality Q-Q plots. Shapiro-Wilk test was also conducted to assess normal distribution. Shapiro-Wilk test p value of >0.05 was considered as a normal distribution. For non-normally distributed quantitative parameters, the mean values were compared between study groups using Mann Whitney U test. Categorical outcomes were compared between study groups using the Chi-square test/Fisher's Exact test (If the overall sample size was <20 or if the expected number in any one of the cells is <5, Fisher's exact test was used.) P value <0.05 was considered statistically significant. coGuide version V.1.0 was used for statistical analysis [12].

Results

A total of 225 participants were included in the final analysis. The prevalence of postpartum haemorrhage among the total deliveries in our institute was 0.73%.

Table 1: Descriptive analysis of age in the study population (N=225)

Age in years	Frequency	Percentages
<20	33	14.67%
20 – 35	191	84.89%
>35	1	0.44%

Among the study population, 33(14.67%) participants were aged <20 years, 191(84.89%) participants were aged between 20 to 35 years, and one (0.44%) participant was aged >35 years (table 1).

Table 2: Descriptive analysis of clinical parameters in the study population (N=225)

Clinical parameters	N (%)
Obstetric Score	
Primigravida	112 (49.78%)
Multigravida	113 (50.22%)
Mode of delivery	
Vaginal delivery	215 (95.56%)
LSCS	10 (4.44%)
Etiology	
Atomic	178 (79.11%)
Traumatic	44 (19.56%)
Tissue / retained bits	3 (1.33%)
Management	
Medical	205 (91.11%)
Surgical	20 (8.89%)
Blood Transfusion	
Yes	99 (44.00%)
No	126 (56.00%)
Blood Products Transfusion	
Yes	45 (20.00%)
No	180 (80.00%)
Surgical Management	
Cervical tear suturing	1 (5.00%)
Subtotal hysterectomy	14 (70.00%)
Total abdominal hysterectomy	1 (5.00%)
Vaginal exploration	4 (20.00%)
Hospital stay (in days) (N=221)	4.71 ± 1.77 (4.0, 14.0)
Mortality	
Survived	221 (98.22%)
Died	4 (1.78%)
Cause of death	
DIC/Shock	3 (75.00%)
Cardiac arrest	1 (25.00%)

Among the study population, 112 (49.78%) women were primigravida, and 113 (50.22%) were multigravida, 215 (95.56%) women delivered vaginally, and 10 (4.44%) women underwent LSCS. Common etiologies were atonic uterus 178 (79.11%), 44 (19.56%) participants had traumatic and three (1.33%) participants had tissue/retained bits. Among the study population, 205 (91.11%) participants underwent medical management, and 20 (8.89%) participants were subjected to surgical management. Out of 225 participants, 99 (44.00%) participants had to undergo blood transfusion, and 45 (20.00%) participants had to undergo blood products transfusion. The majority of the participants (70%) had subtotal hysterectomy surgical management, followed by 20% vaginal exploration and 5% of people had cervical tear suturing and total abdominal hysterectomy for each, respectively. The mean hospital stay was 4.71±1.77 days in the study population; 221 (98.22%) participants survived, and 4 (1.78%) participants died, of which 3 (75.00%) participants had DIC/shock, and 1 (25.00%) participant had GCTS/cardiac arrest after recovering from GA (table 2).

Table 3: Descriptive analysis of risk factors in the study population (N=225)

Risk factors	Frequency	Percentage
Induced labor	36	16.0%
Prolonged labor	25	11.1%
Preeclampsia	10	4.4%
Macrosomia	8	3.6%
Polyhydramnios	7	3.1%
GDM	6	2.7%
Twins	6	2.7%
Anemia	5	2.2%
Outlet forceps	4	1.8%
Precipitate labor	3	1.3%
Assisted breech	2	0.9%
Prolonged 3rd stage	2	0.9%
Abruption placenta	1	0.4%
Cervical tear	1	0.4%
No risk factor	109	48.4%

The majority of the participants had induced labor 16%, followed by 11.1% prolonged labor, 4.4% preeclampsia, 3.6% macrosomia, 3.1% had polyhydramnios, 2.7% GDM and twins for each, and 2.2% anaemia, respectively (table 3).

Around 91.11% of patients were medically managed, and 8.88% were treated surgically. The difference in the obstetric score between the management is insignificant with a “p”-value of 0.166, with majority 13 (65%) being multi gravida in the surgical group. The difference in the mode of delivery between the management is insignificant with a “p”- value of 0.219, with a majority of 197 (96.1%) women with vaginal delivery who underwent medical management. The difference in mortality between the control is significant, with “p” value of 0.041, with a majority of 203 (99.02%) participants surviving in the medical group. There was a statistically significant difference between the mode of management with a hospital stay in days (p value <0.001) (table 4).

Table 4: Comparison of clinical parameters between management (N=225)

Clinical Parameters	Management		Chi square	P value
	Medical (N=205)	Surgical (N=20)		
Obstetric Score				
Primigravida	105 (51.22%)	7 (35%)	1.918	0.166*
Multigravida	100 (48.78%)	13 (65%)		
Mode Of Delivery				
Vaginal	197 (96.1%)	18 (90%)	1.595	0.219*
LSCS	8 (3.9%)	2 (10%)		
Etiology				
Atonic	164 (80%)	14 (70%)		
Traumatic	38 (18.54%)	6 (30%)	†	†
Tissue/Retained Bits	3 (1.46%)	0 (0%)		
Blood Transfusion				
Yes	79 (38.54%)	20 (100%)	†	†
No	126 (61.46%)	0 (0%)		
Blood Products Transfusion				
Yes	27 (13.17%)	18 (90%)	67.226	<0.001*
No	178 (86.83%)	2 (10%)		
Mortality				
Survived	203 (99.02%)	18 (90%)	8.499	0.041*
Dead	2 (0.98%)	2 (10%)		
Hospital stay (in days) [N=221]	4 (4 to 4)	10 (10 to 10)	-	<0.001‡
Cause Of Death				
DIC/Shock	2 (100%)	1 (50%)		
GCTS/Cardiac arrest after recovering from GA	0 (0%)	1 (50%)	†	†

** Chi-Square test. † No statistical test was applied due to 0 subjects in one of the cells.‡: Mann Whitney U test*

Discussion

The prevalence of postpartum haemorrhage among the total deliveries was 0.73%. The common etiologies found in the study were atonic uterus, traumatic, and tissue/retained bits. In contrast, a study by Dayal N et al [13] reported a prevalence of 1.37%. Tasneem et al [14] and Pratima D et al [15] reported a prevalence of 3.55% and 2%, respectively. The majority of the participants were aged between 20 to 35 years (84.89%), followed by 14.67% participants aged <20 years and 0.44% aged >35 years. In the present study, the risk of PPH in advanced maternal age >20 years was higher than in low maternal age. Similar results were observed in a study by Ijaiya MA et al; advanced maternal age showed a two fold higher risk of PPH than low maternal age < 25 years [16]. In contrast, Lao et al [8] and Singh A et al [17], reported a decrease in PPH with low maternal age, the risk decreasing progressively from 25 years to >40 years.

About 49.78% of women were primigravida, and 50.22% of women were multigravida in this study. 95.56% of women delivered vaginally, and 4.44% were LSCS. Adetoro O et al reported that PPH was high in both primipara and grand multipara [18]. Also, Ohkuchi et al found that primiparity in participants who delivered vaginally was associated with excessive blood loss [19]. But Babinszki et al [20], in their study, showed that grand multiparas had a higher incidence of PPH while Selo-Ojeme et al [21] reported that there is no association between parity and PPH.

A maximum number of PPH cases were atonic in the present study (79.11%). Similarly, studies by Singh A et al [17], Tasneem et al[14], and Pratima D et al [15] reported atonicity as the most common cause of PPH. The majority of the participants (16%) had induced labor, followed by 11.1% prolonged labor, in the present study. The analysis by Brinsden et al [22] showed an increase in the incidence of PPH after induction of labor. They also reported an increase in PPH nearly twice among primiparous patients after induced labor compared to that in spontaneous labor. These findings indicate that PPH due to the atonic uterus is another complication of labor induction. Khireddine et al [23] reported a 20% increase in the risk of PPH and severe PPH in low-risk parturient after an induced labor, regardless of the method of induction used. This excess risk was found for induction with both oxytocin and prostaglandins. The drugs used for labor induction might affect the uterine muscle directly and could act as a fatigue factor on the myometrium, thereby causing postpartum atony and possibly PPH.

In this study, 91.11% of participants underwent medical management, and 8.89% were surgically managed. Similar results were reported by Nanani M et al[24], 81% of participants with PPH were treated with uterotonic agents in their study. A study conducted by Naina Kumar et al [25] reported that early timely intervention by active management of the third stage of labor with the help of uterotonic with or without blood transfusion helps in the prevention of PPH. Kramer MS et al [26] studied 1,03,726 deliveries during their study period, among which 2.3% had PPH; 0.15% had a PPH accompanied by a blood transfusion and/or hysterectomy. In a study by Rajeshwari et al[27], 69 % of cases of PPH were controlled with uterotonic agents, 27 % required surgical management like B lynch sutures or Hayman sutures and hysterectomy. Blood transfusion was done for 18% of cases. In this study, among the participants who underwent surgical management, the majority of the participants, 70% had subtotal hysterectomy, followed by 20% vaginal exploration.

In India, according to the 2006 National Family Health Survey most common cause of maternal mortality was postpartum haemorrhage and accounted for 25 to 33% of all maternal deaths [13]. Mortality rate was 1.78% in this study, of which 3 participants had DIC/shock, and 1 participant had GCTS/cardiac arrest after recovering from GA. The study by Dayal N et al [13] reported 21.73% maternal mortality. In

contrast, there was no maternal death due to primary PPH in a study by Nanani M et al [24].

Following prompt measures for resuscitation and management based on the etiology is the key to treat PPH, which includes administration of fluid and blood. The medical management practiced in our institute includes uterotonic agents (oxytocin infusion, injection carboprost, injection methergine, tablet misoprostol per rectal, injection tranexamic acid 1g in 100ml normal saline over 15 min), bimanual uterine compression, and tamponade techniques like Foley balloon tamponade. If these methods fail to control the bleeding, the next step is usually surgical, which includes uterine bracing suture application, vessel ligation, or hysterectomy. However, the patient usually receives multiple blood transfusions by the time surgery is performed, which may itself cause life threatening complications like DIC, ARDS, etc., thereby further increasing the morbidity and mortality of surgical procedures. Hence, it is evident that clear cut guidelines along with training of health professionals are required in every obstetric unit in order to manage such acute emergencies [28].

This is a retrospective study, and some data could be missing for the analysis due to the non-availability of all the information or data needed from the patients' case files, which can be considered as a limitation of this study. Additionally, long-term complications such as amenorrhea, infertility, or fistula were not assessed in this present study.

Conclusion

The prevalence of postpartum hemorrhage was comparatively low in our study. Common etiologies were atonic uterus, traumatic, and tissue/retained bits. The most frequently encountered risk factors were induced labor, followed by prolonged labor and preeclampsia. The majority of the patients were treated medically, and the common cause of death in PPH patients was DIC/Shock. The majority of the surgical treatment done was a subtotal hysterectomy. Basic resuscitation followed by investigation and treatment of the specific cause can reduce morbidity and mortality. Most efforts should be focused on uterine atony, which is the primary cause of postpartum hemorrhage. The maternal mortality rate and the figures of PPH can be reduced by timely referrals and peripheral basic non-invasive management.

Conflict of interest: None. **Disclaimer:** Nil.

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