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# Trends of Postpartum Haemorrhage and Its Management in Tertiary Care Hospital, Bangladesh

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**Key words:**
Postpartum Haemorrhage, Third stage of labour.

## Abstract

***Background:*** *Postpartum hemorrhage (PPH) is the leading cause of maternal mortality globally, accounting for nearly 25% of maternal deaths. In low-resource settings, it contributes to almost half of all postpartum fatalities, highlighting the urgent need for early identification and effective management. The aim of the study is to evaluate the clinical and demographic profile of patients experiencing postpartum hemorrhage (PPH) and to identify associated risk factors.* ***Methods:*** *This prospective observational study was conducted over six months (July 2022 to December 2022) in the Department of Obstetrics and Gynaecology at Sir Salimullah Medical College Mitford Hospital, Dhaka. All patients admitted with postpartum hemorrhage (PPH), or who developed PPH after vaginal delivery or cesarean section within the hospital, were included. PPH was defined as blood loss exceeding 500 mL after vaginal delivery or 1,000 mL after cesarean section, or any postpartum bleeding leading to clinical shock, transfusion, or surgical intervention. Data were collected using a structured checklist and analyzed using SPSS.* ***Results:*** *Out of 1,845 deliveries during the study period, 189 cases (10.24%) of postpartum hemorrhage (PPH) were identified 109 patients were referred from outside the hospital, while 80 developed PPH in-hospital. Among in-hospital deliveries, the incidence of PPH was 6.26%, despite active management of the third stage of labor. The leading causes were retained placenta with uterine atony (70.69%), genital tract injury (14.68%), uterine atony alone (8.25%), morbidly adherent placenta (5.46%), and uterine inversion (0.92%). Most patients were over 35 years of age, with a mean monthly family income of 4,200 Tk. Multiparity was seen in 61.90%, and 75.13% had received antenatal care; however, 60.85% had no identifiable risk factors. Notably, 84.40% of cases delivered by untrained birth attendants. On admission, 57.67% were in shock. Management included manual removal of placenta (44.37%), genital tract repair (13.76%), uterine vessel ligation (6.08%), condom tamponade (4.23%), and hysterectomy (5.82%). The overall recovery rate was 98.94%; one patient (0.53%) developed Sheehan's syndrome, and one (0.53%) died.* ***Conclusion:*** *PPH was more common among older, multiparous, and low-income women, with many cases occurring without identifiable risk factors. Active management of the third stage of labor and prompt interventions markedly reduced complications and improved outcomes, emphasizing the need for skilled attendance and timely care.*

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**Introduction:**

Globally, an estimated 260000 women died from a maternal cause in 2023, equivalent to over 700 maternal deaths every day, and approximately one every two minutes. This is significantly lower than in 2000, when there were an estimated 443000 maternal deaths. The global MMR in 2023 was estimated at 197 maternal deaths per 100 000 live births, down from 328 in 2000 – a reduction of 40.0% over the full 24-year period.[1] Excessive bleeding after childbirth, known as postpartum hemorrhage (PPH), remains a leading cause of maternal mortality worldwide. Of the estimated 260000 maternal deaths in 2023, nearly 45 000 were attributable to PPH.[2] PPH occurs in approximately 1% to 3% of all deliveries and is the leading cause of obstetric morbidity and mortality worldwide, accounting for approximately 8% of maternal deaths in developing countries and 20% of maternal deaths in developed countries.[3] In Bangladesh, PPH is a leading cause of maternal deaths, responsible for about 31% of deaths in 2016 and 42% of reported cases in 2023 data.[4] Physiologic changes during pregnancy, including an increase in uterine blood flow from approximately 100 mL/min in a nonpregnant uterus to 700 mL/min, coagulation changes resulting in a hypercoagulable state, and postpartum changes (e.g., myometrial contraction and local decidual hemostatic factors) cause significant bleeding. Therefore, conditions that lead to a failure of these mechanisms can result in PPH. A loss of an approximate total blood volume of more than 1500 mL will typically cause clinical features of hypovolemia.[5] There are numerous well established risk factors for postpartum haemorrhage, such as obesity, anaemia, history of previous postpartum haemorrhage, and caesarean birth.[6] Some of these risk factors are modifiable (i.e, they encompass behaviors and conditions that can be altered or controlled to reduce the risk of postpartum haemorrhage). Knowledge of their level of association with postpartum haemorrhage can help target strategies to mitigate their effect. It can also help to identify individuals at high risk of postpartum haemorrhage who might require closer monitoring as well as enhanced prophylaxis and treatment.[7]

PPH is frequently subdivided based on symptom onset. Primary PPH is hemorrhage that occurs between the third stage of labor (i.e., delivery of the placenta) and 24 hours after fetal delivery; secondary PPH occurs more than 24 hours after delivery—up to 12 weeks postpartum. Causes, summarized by the 4 "T's" (tone, trauma, tissue, thrombin), require prompt intervention. Management involves a multidisciplinary approach, emphasizing blood loss assessment, fluid replacement, and source control. Despite advancements, PPH prevention and prediction remain essential to maternal well-being. PPH poses a significant challenge in obstetrics, complicated by difficulties in accurately estimating blood loss, as cognitive biases can lead to delays in diagnosis and management. Interprofessional approaches, including PPH bundles and perinatal quality collaboratives, reduce morbidity. Management involves a coordinated effort addressing uterine atony, genital tract lacerations, retained placental tissue, and coagulopathy, with surgical interventions like hysterectomy as a last resort. Prevention strategies include active management of the third stage of labor and prenatal identification of high-risk factors. Vigilance and prompt intervention remain crucial in mitigating maternal morbidity and mortality associated with PPH.[5,8]

At Sir Salimullah Medical College Mitford Hospital (SSMCMH), active management is routinely practiced using intramuscular oxytocin and controlled cord traction. However, approximately 90% of deliveries in the surrounding region still occur at home, often conducted by untrained attendants. These deliveries typically rely on physiological management, increasing the risk of severe PPH and delayed hospital referral.

Bangladesh's maternal mortality rate declined last few years, yet two-thirds of maternal deaths still occur postpartum. PPH remains a significant contributor to these deaths, even in developed settings.

This study aims to evaluate the trends, causes, and management of PPH at SSMCMH, comparing outcomes between hospital and referred cases. The findings may support improved clinical practices and inform future maternal health policy and research.

**Methods:**

This prospective observational study was conducted over a six-month period, from June 1, 2022, to

December 31, 2022, in the Department of Obstetrics and Gynaecology at Sir Salimullah Medical College Mitford Hospital (SSMCH), Dhaka. A total of 1,845 patients were admitted during the study period, of which 1,466 were enrolled. Among them, 1,357 were admitted for delivery, and 109 were admitted as diagnosed cases of postpartum hemorrhage (PPH). Of the women admitted for delivery, 80 developed PPH post-delivery, while 1,277 had deliveries without PPH. PPH was defined for in-hospital deliveries as estimated blood loss exceeding 500 mL after vaginal delivery or 1,000 mL after cesarean section, as assessed by the attending obstetrician. For referred cases, PPH was defined as hemorrhage leading to clinical shock, requiring blood transfusion, or necessitating emergency interventions such as aortic compression, condom tamponade, uterine or pelvic vessel ligation, or hysterectomy. Patients who were brought in dead due to suspected PPH were excluded. Data were collected using a pre-tested, structured, interviewer-administered checklist, with information obtained from patients or their attendants. Relevant clinical investigations included hemoglobin estimation, blood grouping and cross-matching, bedside clotting test, urine R/M/E, prothrombin time, platelet count, random blood sugar, and ultrasonography. Each patient was assigned a unique code to maintain confidentiality. Data were entered into a computer, verified for completeness, and analyzed using the SPSS software version 23.

**Results:**

Table 1 shows that the majority of postpartum hemorrhage (PPH) patients were between 36–40 years of age (41.8%), with a mean age of 34.5 years. Most had completed secondary education (SSC, 52.9%) and resided in rural areas (82%). A significant proportion (75.1%) had received at least some form of antenatal care, although nearly one in four were unbooked at the time of delivery.

Table 2 shows that the majority were multiparous (61.9%) and had no significant medical or obstetric history (60.8%). A substantial number had anemia (21.2%) or prior uterine procedures (23.8%). Among referred cases (n = 109), most deliveries were conducted by unskilled birth attendants (84.4%).

**Table I:** Sociodemographic and antenatal characteristics of postpartum hemorrhage (PPH) patients (n = 189).

| Variable | Category | No. of Patients | Percentage |
|---|---|---|---|
| Age (years) | ≤20 | 4 | 2.1 |
| | 21–25 | 11 | 5.8 |
| | 26–30 | 21 | 11.1 |
| | 31–35 | 63 | 33.3 |
| | 36–40 | 79 | 41.8 |
| | >40 | 11 | 5.8 |
| | Mean ± SD | 34.5±8.11 | |
| Education Level | No Schooling | 12 | 6.3 |
| | Primary | 55 | 29.1 |
| | SSC | 100 | 52.9 |
| | HSC | 22 | 11.6 |
| Residence | Urban | 34 | 18.0 |
| | Rural | 155 | 82.0 |
| Antenatal Check-up | Booked | 142 | 75.1 |
| | Unbooked | 47 | 24.9 |

**Table 2.** Obstetric, Medical, Surgical, and Delivery Characteristics of PPH Patients (n=189)

| Characteristic | Category | No. of Patients | Percentage |
|---|---|---|---|
| Parity | Primipara | 72 | 38.1 |
| | Multipara | 117 | 61.9 |
| Relevant Medical & | No known history | 115 | 60.8 |
| Obstetric History | Anemia | 40 | 21.2 |
| | Multiple pregnancy | 13 | 6.9 |
| | Antepartum hemorrhage (APH) | 9 | 4.8 |
| | Pre-eclampsia/toxaemia (PET) | 7 | 3.7 |
| | Jaundice | 5 | 2.6 |
| Past Surgical History | No prior uterine surgery | 115 | 60.8 |
| | Dilatation & curettage (D&C), menstrual regulation (MR), etc. | 45 | 23.8 |
| | Previous cesarean section (C/S) | 26 | 13.8 |
| | Myomectomy | 3 | 1.6 |
| Birth Attendant | Unskilled birth attendant | 92 | 84.4 |
| (in referred PPH cases, n = 109) | Skilled birth attendant | 17 | 15.6 |

**Table 3.** Delivery details, clinical presentation, and emergency response among PPH patients (n=189)

| Parameter | Category | No. of Patients | Percentage |
|---|---|---|---|
| Mode of Delivery | Normal vaginal delivery (NVD) | 119 | 63.0 |
| | Cesarean section (C/S) | 60 | 31.7 |
| | Instrumental delivery | 10 | 5.3 |
| Time Interval Between | < 2 hours | 8 | 4.2 |
| PPH Onset and Hospital | 2–6 hours | 80 | 42.3 |
| Admission (n=109 referred | >6–12 hours | 9 | 4.8 |
| patients) | >12–24 hours | 7 | 3.7 |
| | >24–31 hours | 5 | 2.6 |
| | Hospital-Onset PPH (SBMCH) | 80 | 42.3 |
| Clinical Presentation | With shock | 109 | 57.7 |
| | Without shock | 80 | 42.3 |
| Need for Blood Transfusion | Required | 156 | 82.5 |
| | Not required | 33 | 17.5 |

Table 3 shows that normal vaginal delivery (63%) was the most common mode of delivery among PPH cases, followed by cesarean section (31.7%). Among referred patients, 42.3% arrived within 2–6 hours of symptom onset, while 42.3% of total cases developed PPH in-hospital. More than half of the patients (57.7%) presented with shock, and a large majority (82.5%) required blood transfusion, indicating the severity of clinical presentation and the urgency of intervention.

**Table IV.** Causes of postpartum hemorrhage among referred and in-hospital patients

| Cause of PPH | Referred PPH Cases (n = 109) | In-Hospital PPH Cases (n=80) |
|---|---|---|
| Retained placenta/incomplete placental delivery with uterine atonicity | 77 (70.7%) | — |
| Retained placenta/incomplete placental delivery with morbid adherence | 6 (5.5%) | — |
| Uterine atonicity (alone) | 9 (8.3%) | 66 (82.5%) |
| Genital tract injury | 16 (14.7%) | 9 (11.3%) |
| Retained placenta/incomplete placental delivery (without atonicity) | — | 5 (6.25%) |
| Uterine inversion | 1 (0.9%) | — |
| Total | 109 (100%) | 80 (100%) |

**Table-5.** Length of Hospital Stay By PPH patients (n=189)

| Hospital stay | No. of Patients | Percentage |
|---|---|---|
| 1 day | 22 | 11.6 |
| 2-6 days | 111 | 58.7 |
| 7 days>= | 56 | 29.6 |
| **Total** | 189 | 100.0 |

Table 4 shows that the leading cause of PPH among referred patients was retained placenta with uterine atonicity (70.7%), whereas isolated uterine atony (82.5%) was the most common cause among in-hospital cases. Genital tract injury ranked second in both groups.

Table 5 shows that the majority of postpartum hemorrhage (PPH) patients (58.7%) had a hospital stay ranging from 2 to 6 days. About 29.6% required extended hospitalization of 7 days or more, while only 11.6% were discharged within 24 hours, reflecting the severity and complexity of PPH management in many cases.

Table 6 shows that the most common intervention among PPH patients was manual removal of placenta or retained bits (45%), followed by genital tract repair (13.8%). Conservative treatments like injectable uterotonics were used in 11.6% of cases, and condom tamponade was applied in 4.2%. More invasive procedures such as hysterectomy (5.8%) and arterial ligation (6.9%) were reserved for severe or refractory cases. Notably, B-Lynch sutures were not used during the study period.

**Table-VI:** Distribution of Specific Management of PPH patients (n=189)

| | No. of Patients | Percentage |
|---|---|---|
| Conservative | | |
| Injectable uterotonic | 22 | 11.6 |
| Injectable uterotonic + CCT | 9 | 4.8 |
| Injectable uterotonic + Rectal Uterotonic | 13 | 6.9 |
| Condom tamponade | 8 | 4.2 |
| Surgical | | |
| Manual Removal of Placenta or Bit | 85 | 45.0 |
| Repair of genital tract injury | 26 | 13.8 |
| Legation of uterine and ovarian artery | 13 | 6.9 |
| Hysterectomy | 11 | 5.8 |
| Legation of internal iliac artery | 2 | 1.1 |
| B-Lynche suture | 0 | 0.0 |
| **Total** | 189 | 100.0 |

**Table-VII:** Clinical Outcome of PPH patients (n=189)

| Outcome | No. of Patients | Percentage (%) |
|---|---|---|
| Improved | 187 | 98.9 |
| Improved with Complication | 1 | 0.5 |
| Dead | 1 | 0.5 |
| **Total** | 189 | 100.0 |

Table 7 shows that the clinical outcome of PPH patients was overwhelmingly favorable, with 98.9% of patients recovering without major complications. Only one patient (0.5%) developed Sheehan's syndrome, and one patient (0.5%) died due to complications from severe hemorrhage.

**Discussion:**

Postpartum hemorrhage (PPH) remains a major contributor to maternal mortality in low-resource settings, including Bangladesh, where the maternal mortality ratio ranges between 320 and 400 per 100,000 live births. Obstetric hemorrhage is the leading direct cause of maternal death. Globally, PPH incidence ranges from 5% to 8% where prophylaxis is practiced but can reach 18% in areas with limited resources.

In the present study, the overall incidence of PPH was 10.24% among all deliveries, and 5.89% among women who developed PPH after hospital delivery. Postpartum hemorrhage (PPH) is an obstetric emergency complicating 1–10% of all deliveries.[9,10]

Maternal age >35 years emerged as a significant risk factor. The majority of cases (41.8%) occurred among women aged 36–40 years. This aligns with findings from Pregnant Women in Tibet Health Facilities, where women over 35 had significantly higher risks of PPH along with other risk factors [11].

Socioeconomic and educational profiles also reflect known disparities. Over 60% of patients had monthly family incomes below 3,000 Taka, with a mean income of 4,200 Taka. A recent study also suggests household income was significantly associated with PPH indicating that mothers from low-income families had over three times higher risk of PPH.[12] More than half (52.9%) of patients had completed secondary education, and 75.1% received some form of antenatal care higher than regional WHO estimates for developing countries[13].

Multiparity was seen in 61.9% of cases. One study finds Parity is a risk factor for the occurrence of postpartum hemorrhage in a district hospital in Indonesia. Parity with risk (parity of 1 or e"3) increases the risk of postpartum hemorrhage by fivefold. [14]

Medical and obstetric history was unremarkable in most patients (60.85%), though anemia (21.2%) and multiple pregnancy (6.9%) were notable. This supports existing literature showing that PPH may occur in women both with and without identifiable risk factors[15].

Prior uterine surgery was reported in 39.2% of cases, with previous cesarean section accounting for 13.8%. This is consistent with studies indicating prior Caesarean section are significantly associated with the risk of PPH[16].

Among the total cohort, 63% delivered vaginally, 31.7% via cesarean section, and 5.3% by instrumental methods. The incidence of PPH following LUCS was 6.09%, closely matching Magann's estimate of 6% for cesarean-associated hemorrhage[17].

The majority of patients (82.5%) required blood transfusion. A study also suggests transfusion is an important part of PPH management, especially ongoing hemorrhage. The goals of appropriate blood product transfusion are to maintain circulating blood volume and tissue oxygenation and to prevent or reverse coagulopathy. The lack of access to blood products can result in death of the mother.[18]

The active management of the third stage of labor showed promising results. Among those managed actively, only 5.4% had blood loss >500 mL during NVD, and 6.1% after LUCS. These rates are comparable to large RCTs (e.g., Bristol, Hinchingbrooke, and Abu Dhabi), which found blood loss >500 mL in 5.9%, >1000 mL in 0.8%, transfusion in 2.1%, and retained placenta in 1.9% of cases[19].

Retained placenta with uterine atony was the most common cause of PPH among referred patients (70.7%), while isolated uterine atony accounted for

82.5% of in-hospital cases. Retained placenta can be benign or life-threatening when the placenta is morbidly adherent to the uterus. Morbidity and mortality from adherent placenta and subsequent postpartum hemorrhage are higher in underdeveloped countries and in hospitals without adequate medical equipment to handle high-risk cases. The retained placenta has a case mortality rate of nearly 10% in rural areas[20].

Management strategies included conservative interventions (uterotonics, controlled cord traction, tamponade) and surgical procedures (manual removal of placenta, artery ligation, hysterectomy). Most cases were managed effectively without major surgery. Condom tamponade had a reported success rate of 87% in predicting control of bleeding, avoiding further surgical intervention. FIGO (International Federation of Gynecology and Obstetrics) recommends health workers at all levels of care (particularly in LMICs) need to have access to appropriate medications [21] and training in PPH prevention and management procedures. All attempts should be made to reduce PPH using cost-effective, resource-appropriate interventions. At first, all should be done to avoid PPH and reduce the need for expensive, lifesaving surgical interventions. The routine use of active management of the third stage of labor by all attendants, regardless of where they practice, should be recommended.[22] All birth attendants must know how to provide safe care (physiologic management) to prevent PPH in the absence of uterotonic drugs[23].

Outcomes were favorable: 98.9% of patients recovered, one developed Sheehan's syndrome, and one patient died. These results reflect the benefit of timely intervention and adherence to standardized protocols, particularly the active management of the third stage of labor, as recommended by the Obstetrical and Gynaecological Society of Bangladesh (OGSB).

**Conclusion:**

This study confirms PPH as a major obstetric emergency in Bangladesh, driven mainly by uterine atony and retained placenta. Most cases were successfully managed with medical or surgical interventions. Expanding skilled birth attendance and rapid emergency care remains essential to further reduce PPH-related morbidity and mortality.

**Limitations:**

Single-center and the relatively short study duration might limit validity. Future multi-center studies with longer follow-up periods will provide more comprehensive insights.

**Data Availability:**

The datasets analysed during the current study are not publicly available due to the continuation of analyses but are available from the corresponding author on reasonable request.

**Conflict of Interest:**

The authors stated that there was no conflict of interest in this study.

**Funding:**

This research received no external funding.

**Ethical consideration:**

The study was approved by the Ethical Review Committee of Sir Salimullah Medical College Mitford Hospital, Dhaka, Bangladesh. Informed consent was obtained from each participant or caregivers of the patients.

**Author Contributions:**

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; had agreed on the journal to which the article had been submitted; and agreed to be account able for all aspects of the work.

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