



A PROSPECTIVE STUDY TO ASSESS THE RISK FACTORS AND EFFECTIVENESS OF MANAGEMENT STRATEGIES IN POSTPARTUM HAEMORRHAGE

Obstetrics & Gynaecology

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ABSTRACT

Background: Postpartum haemorrhage (PPH) is a major cause of maternal morbidity and mortality worldwide, with a higher burden in low- and middle-income countries. Uterine atony remains the leading cause, though multiple risk factors contribute. This study aimed to assess risk factors, clinical profiles, management strategies, and maternal outcomes in PPH. **Methods:** A prospective study was conducted in the Department of Obstetrics and Gynaecology, Shri M.P. Shah Government Medical College, Jamnagar, over six months (January–July 2025). A total of 100 patients diagnosed with PPH, either admitted directly or referred from peripheral centres, were included. Diagnosis was based on visual estimation of blood loss >500 ml, hemodynamic instability, and clinical features of haemorrhagic shock. **Results:** Multiparas (41%) and grand multiparas (31%) were the most affected groups, with maximum cases in the 24–30 year age group (46%). Uterine atony was the leading cause (62%), followed by traumatic causes (23%) and mixed etiologies (14%). Vaginal delivery accounted for 71% of cases, while cesarean section (29%) contributed to most severe cases. No identifiable risk factors were present in 45% of women; anemia (14%), prolonged/obstructed labour (11%), pre-eclampsia (10%), and multiple gestation/polyhydramnios (10%) were the common risk factors. All patients received medical therapy and bimanual compression; advanced measures included vessel ligation (15%), balloon tamponade/uterine packing (15%), compression sutures (2%), and obstetric hysterectomy (2%). Morbidity was significant, with universal blood transfusion (100%), ICU admission (52%), severe anemia (38%), hypovolemic shock (10%), DIC (10%), and sepsis (10%). **Conclusion:** PPH is largely unpredictable, with uterine atony as the predominant cause. Although vaginal deliveries were more common, cesarean sections were associated with greater severity. Timely medical and surgical interventions, antenatal anemia correction, and institutional preparedness are essential to reduce maternal morbidity and improve outcomes.

KEYWORDS

Postpartum Haemorrhage, Uterine Atony, Cesarean Section, Maternal Morbidity, Risk Factors, Obstetric Management, crumb rubber, utilization, compressive strength, low cost, sustainable

INTRODUCTION

- The third stage of labour is the pivotal stage for women since unexpected serious complications can occur following uneventful and normal first and second stage of labour.
- Postpartum haemorrhage is the significant contributor for maternal mortality and morbidity.
- In day today life around 1600 women die in childbirth and of which approximately 500 bleed to death. Leading cause is atonic PPH and more than 99 % in the developing countries.
- Incidence of PPH is reported as 2% to 4% after vaginal delivery and 6% after caesarean section.
- It has been observed that most deaths from PPH occur in middle and low income countries.
- India has an unexpectedly high maternal death rate of 540 per 1,00,000 live births.

DEFINITION

- Quantitatively PPH is defined as bleeding from genital tract of more than 500ml after birth of baby up to the end of puerperium(6weeks). If it occurs within first 24hrs it is called primary PPH, if it occurs after 24hrs to end of puerperium it is called secondary PPH. As per ACOG, any blood loss $\geq$ 1 litre irrespective of mode of delivery is called PPH.
- Clinically vaginal blood loss irrespective of its amount post delivery upto the end of puerperium as a result of which patient becomes hemodynamic ally unstable associated with tachycardia and hypotension.
- Practically hematocrit drop of 10% or haemorrhage requiring immediate transfusion.
- The average blood loss after vaginal delivery is 500ml, after caesarean section 1 litre and post caesarean hysterectomy is 1.5 litre.
- It can also be classified as minor PPH(Blood loss 500ml to 1 litre),major PPH(blood loss 1 to 2 litre) and massive PPH(blood loss>2 litre)

AIMS AND OBJECTIVES

The purpose of this study is to identify, enumerate and decide frequency of risk factors in PPH and effectiveness of management strategies which will reduce significant reduction of hospital stay and

also decreases the long term psychological impact of PPH on affected women.

MATERIALS AND METHODS

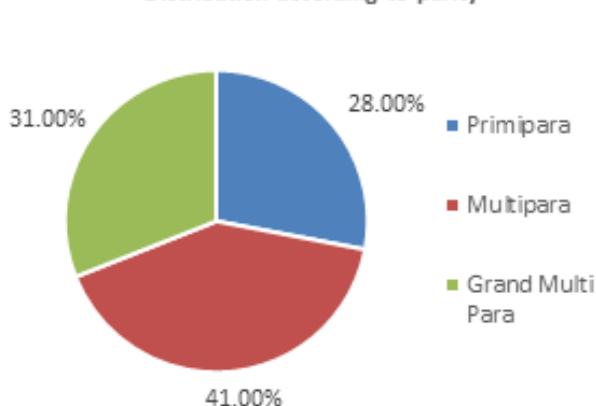
- This is a prospective study conducted in the department of obstetrics and gynaecology at Shri M P SHAH medical college Jamnagar for a period of 6 months January 2025 to July 2025 among which 100 patients had PPH.
- This study included all patients admitted primarily in our department also those referred from primary and community health centre of nearby areas were included.
- Estimation and diagnosis of PPH was based on visual estimation of blood loss>500ml, general condition, tachycardia, hypotension, signs and symptoms of hemorrhagic shock for diagnosis of PPH.

RESULTS

Distribution According To Parity

Parity	No. of Patients	Percentage
Primipara	28	28.00%
Multipara	41	41.00%
Grand Multi Para	31	31.00%

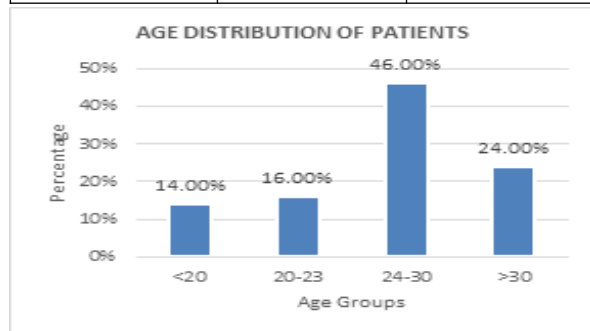
Distribution according to parity



Age Distribution Of Patients

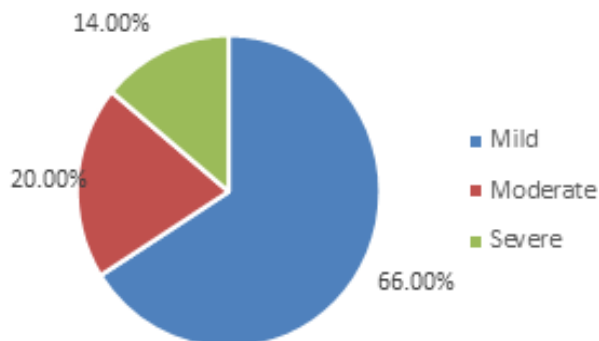
Highest number of cases i.e. 40 out of 86 were in 24-30 yrs age group.

Age group	No. of Patients	Percentage
<20	14	14.00%
20-23	16	16.00%
24-30	46	46.00%
>30	24	24.00%

**Distribution According To Severity**

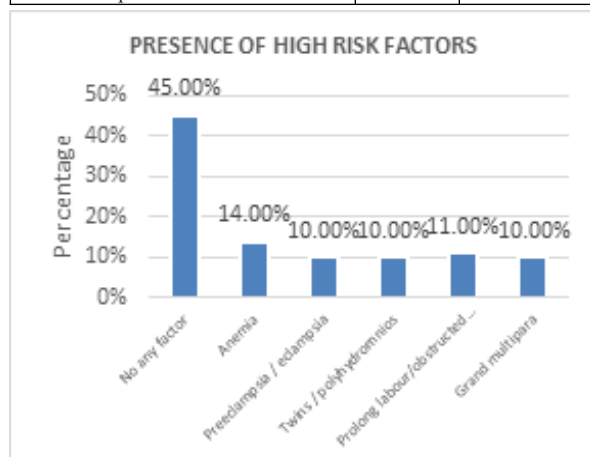
Highest number of cases i.e. 66 out of 100 were in mild severity.

Severity Level	No. of Patients	Percentage	Percentage of blood loss
Mild	66	66.00%	1-2
Moderate	20	20.00%	2-3
Severe	14	14.00%	4

DISTRIBUTION ACCORDING TO SEVERITY**Presence Of High Risk Factors**

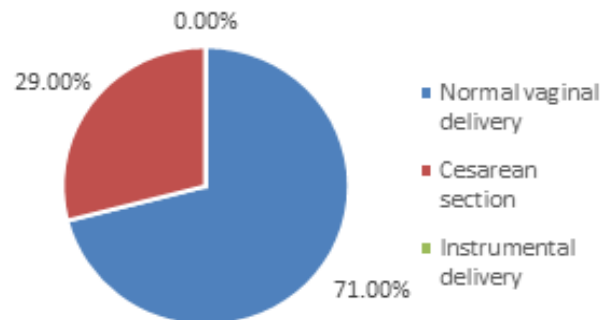
In this study about 40% patients belonged to rural area and low socioeconomic status. In 46.51% of PPH cases there was no identifiable risk factors.

High risk factor	Number	Percentage
No any factor	45	45.00%
Anemia	14	14.00%
Preeclampsia / eclampsia	10	10.00%
Twins / polyhydramnios	10	10.00%
Prolong labour/obstructed labour	11	11.00%
Grand multipara	10	10.00%

**Distribution According To Mode Of Delivery**

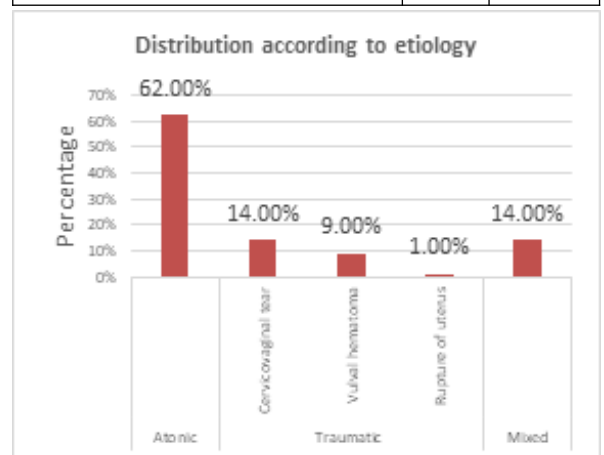
Out of the total 100 patients, cesarean section 29 cases (29.00%). Out of 29 cesarean section cases, 15 are severe case of PPH and 14 are moderate cases of PPH. Normal vaginal delivery was observed in 71 patients (71.00%), while no cases of instrumental delivery were reported (0%). This indicates that cesarean section was the most common mode of delivery in this group.

Mode of delivery	No. of patients	Percentage
Normal vaginal delivery	71	71.00%
Cesarean section	29	29.00%
Instrumental delivery	0	00.00%

Distribution according to mode of delivery**Distribution According To Etiology**

The data presents the etiology (causes) of postpartum hemorrhage in a group of patients. The most common cause identified was atonic uterus, accounting for 62 cases or 62.00% of the total. Traumatic causes collectively made up 23.00% of cases and were further broken down into cervicovaginal tears (14 cases, 14.00%), vulval hematomas (9 cases, 9.00%), and rupture of the uterus (1 case, 1.00%). Additionally, mixed causes, involving a combination of atonic and traumatic factors, were seen in 14 cases, also representing 14.00% of the total. This data indicates that uterine atony is the leading cause of postpartum hemorrhage in this group, followed by various traumatic injuries and mixed etiologies.

Etiology		Number	Percentage
Atonic		62	62.00%
Traumatic (24.41%)	Cervicovaginal tear	14	14.00%
	Vulval hematoma	9	9.00%
	Rupture of uterus	1	1.00%
Mixed		14	14.00%

**Frequency Of Management Strategies**

In the Present study, the management strategies used for postpartum hemorrhage (PPH) in 100 patients. All patients (100%) received medical management and bimanual uterine compression as first-line treatments. More advanced interventions were required in select cases: vessel ligation (including bilateral uterine, ovarian, or internal iliac arteries) was performed in 15 cases (15.00%), while compression sutures were used in 2 cases (2.00%).

Obstetric hysterectomy was carried out in 2 cases (2.00%), and repair of uterine rupture was necessary in 1 case (1.00%). Drainage of hematomas was performed in 8 cases (8.00%). Additionally, mixed

methods such as balloon tamponade and uterine packing were employed in 15 cases (15.00%).

This data shows that while all patients initially received conservative medical and manual interventions, a significant proportion required surgical or advanced procedures to control bleeding.

Management of PPH	Number	Percentage
Medical management	100	100.00%
Bimanual uterus compression	100	100.00%
Compression suture	2	2.00%
Vessel ligation b/l uterine, ovarian, internal iliac	15	15.00%
Obstetric hysterectomy	2	2.00%
Drainage of hematoma	8	8.00%
Repair of rupture uterus	1	1.00%
Hysterectomy	2	2.00%
Mixed (Balloon tamponade, uterine packing)	15	15.00%

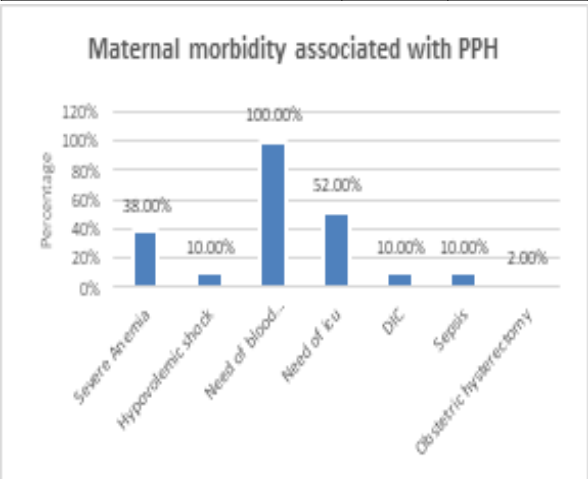


Maternal Morbidity Associated With PPH

The morbidity data among patients with postpartum hemorrhage (PPH) highlights significant health complications. All patients (100%) required blood transfusion, indicating the severity of blood loss. The most common complication was severe anemia, seen in 38 patients (38.00%), followed by a high need for intensive care unit (ICU) admission in 52 cases (52.00%). Hypovolemic shock occurred in 10 patients (10.00%), and serious coagulopathies like disseminated intravascular coagulation (DIC) and sepsis were each reported in 10 patients (100.00%). Obstetric hysterectomy was required in 2 cases (2.00%), reflecting life-saving interventions in refractory cases.

Overall, the data underscores the high morbidity associated with PPH, often requiring intensive and multi-disciplinary management.

Morbidity	Number	Percentage
Severe Anemia	38	38.00%
Hypovolemic shock	10	10.00%
Need of blood transfusion	100	100.00%
Need of ICU	52	52.00%
DIC	10	10.00%
Sepsis	10	10.00%
Obstetric hysterectomy	2	2.00%



DISCUSSION

The present study was conducted to evaluate the clinical profile, etiology, risk factors, management strategies, and maternal outcomes in cases of postpartum hemorrhage (PPH). The findings are discussed and compared with those reported in other published studies.

Distribution According To Parity

- Majority of cases were multiparous (41%), followed by grand multipara (31%) and primipara (28%).
- This suggests that higher parity increases the risk of PPH, likely due to reduced uterine contractility and atony.
- Similar trends have been reported in other studies where multiparity and grand multiparity were strongly associated with uterine atony.

Age Distribution

- Maximum cases (46%) occurred in the age group 24–30 years, which also represents the peak reproductive age.
- Cases were relatively fewer in women <20 years (14%) and >30 years (24%).
- This distribution indicates that PPH is not restricted to advanced maternal age, but is common in the most fertile age group as well.

Severity Of PPH

- Majority of cases were mild (66%), while 20% were moderate and 14% were severe.
- Although severe PPH was less frequent, it accounted for significant maternal morbidity and need for advanced interventions.
- This highlights the importance of early recognition and timely management to prevent progression to severe hemorrhage.

Presence of High-Risk Factors

- No identifiable risk factors were present in nearly half of the cases (45%).
- Anemia (14%), prolonged/obstructed labour (11%), pre-eclampsia (10%), multiple gestation/polyhydramnios (10%), and grand multiparity (10%) were the major contributors.
- This emphasizes that while risk factors increase susceptibility, PPH can occur unpredictably even in low-risk pregnancies, warranting preparedness in all deliveries.

Mode Of Delivery

- Normal vaginal delivery accounted for 71% of PPH cases, while cesarean section contributed to 29%.
- Notably, the majority of severe PPH cases occurred following cesarean section, reflecting higher blood loss in operative deliveries.
- Instrumental delivery was not observed in this study.
- These findings indicate that although PPH is more common after vaginal delivery due to higher numbers, severity is greater in cesarean deliveries.

Etiology Of PPH

- Uterine atony was the leading cause (62%), consistent with global data where it accounts for 60–80% of cases.
- Traumatic causes contributed 23% (cervicovaginal tear 14%, vulval hematoma 9%, rupture uterus 1%).
- Mixed causes (atonic + traumatic) were present in 14%.
- This underscores uterine atony as the primary target for preventive and therapeutic strategies.

Management Of PPH

- All cases received initial conservative measures (medical management and bimanual uterine compression).
- Advanced interventions included: vessel ligation (15%), balloon tamponade/uterine packing (15%), compression sutures (2%), drainage of hematoma (8%), and repair of rupture uterus (1%).
- Obstetric hysterectomy was required in 2 cases (2%), reflecting the role of surgical life-saving procedures when conservative management failed.
- The management approach followed a stepwise escalation protocol, ensuring maximum uterus-saving attempts before hysterectomy.

Maternal Morbidity

- All patients required blood transfusion (100%), indicating significant blood loss.

- Severe anemia was documented in 38%, hypovolemic shock in 10%, and ICU admission in 52% of cases.
- Life-threatening complications included DIC (10%) and sepsis (10%).
- Obstetric hysterectomy was performed in 2% of cases.
- This demonstrates that PPH remains a major cause of maternal morbidity, with high resource utilization (ICU and transfusion requirements).

Overall Interpretation

- The findings reinforce that PPH is largely unpredictable, with uterine atony as the most common etiology.
- Multiparity, cesarean delivery, anemia, and hypertensive disorders remain important contributors.
- Timely medical management and availability of surgical interventions significantly reduce mortality, but morbidity remains high due to transfusion needs and ICU admissions.
- Vigilance, risk stratification, and institutional preparedness are essential to reduce complications and improve maternal outcomes.

Comparison With Other Studies :

1. Parity Distribution

- o **Present study:** Multiparas formed the largest group (41%), followed by grand multiparas (31%).
- o **Brazilian ICU Study:** Reported higher prevalence of PPH among grand multiparas, indicating increased uterine atony with high parity.
- o **Retrospective Cohort (Severe PPH):** Found no strong association with parity, suggesting severe PPH may occur unpredictably regardless of parity.

2. Age Distribution

- o **Present study:** Majority of cases occurred between 24–30 years (46%).
- o **Brazilian ICU Study:** Showed higher incidence in women >30 years, possibly due to comorbidities and late pregnancies.
- o **Retrospective Cohort Study:** Reported cases evenly distributed across age groups, with slightly higher severity in women >35 years.

3. Severity of PPH

- o **Present study:** Mild (66%), moderate (20%), severe (14%).
- o **Brazilian ICU Study:** Severe PPH dominated ICU admissions (>60%), reflecting referral of critical cases.
- o **Retrospective Cohort:** Around 25–30% presented with severe PPH, higher than our series, likely due to tertiary care sampling.

4. Risk Factors

- o **Present study:** No risk factors in 45%; anemia (14%), prolonged labor (11%), preeclampsia (10%).
- o **Brazilian ICU Study:** Hypertensive disorders and cesarean deliveries were the leading associated factors.
- o **Retrospective Cohort:** Placenta previa, accreta, and surgical complications were most frequent, unlike our study where anemia and labor abnormalities predominated.

5. Mode of Delivery

- o **Present study:** Vaginal delivery 71%, cesarean 29%; but severe PPH more frequent in cesareans.
- o **Brazilian ICU Study:** Cesarean section was strongly associated with ICU admissions and severe hemorrhage.
- o **Retrospective Cohort:** Cesarean deliveries accounted for nearly half of severe PPH, supporting our observation that operative delivery increases risk and severity.

6. Etiology

- o **Present study:** Uterine atony (62%), trauma (23%), mixed (14%).
- o **Brazilian ICU Study:** Similar dominance of uterine atony (around 60–70%), followed by surgical trauma.
- o **Retrospective Cohort:** Reported higher rates of abnormal placentation (placenta accreta spectrum) as leading cause in severe cases, contrasting with our population where atony predominated.

7. Management

- o **Present study:** All patients received medical + manual therapy; surgical interventions in selected cases (vessel ligation 15%, hysterectomy 2%).
- o **Brazilian ICU Study:** Hysterectomy rates were much higher (~15–20%), reflecting delayed presentation and severe bleeding.
- o **Retrospective Cohort:** Emphasized use of balloon tamponade,

tranexamic acid, and multidisciplinary surgical approaches, more advanced than our resource-limited setting.

8. Maternal Morbidity

- o **Present study:** 100% blood transfusion, ICU admission 52%, severe anemia 38%, DIC/sepsis 10%.
- o **Brazilian ICU Study:** ICU admission was 100% (study setting), with higher organ failure rates, including renal dysfunction and DIC.
- o **Retrospective Cohort:** Reported higher maternal morbidity from massive transfusion protocols, but overall ICU mortality was lower than Brazilian data, likely due to better preparedness and resources.

Limitations Of The Present Study

- 1. Sample Size:** The study was limited to 100 cases, which may not fully represent the wider population.
- 2. Single-Center Data:** Conducted in one hospital setting, which limits generalizability across different healthcare systems.
- 3. Referral Bias:** Some severe cases might have been referred to higher centers and not included, potentially underestimating severe morbidity.
- 4. Resource Limitations:** Availability of interventions such as balloon tamponade, uterine artery embolization, or massive transfusion protocols was limited, which may influence outcomes compared to international studies.
- 5. Retrospective Data Gaps:** Some risk factors may have been underreported due to incomplete documentation.
- 6. No Long-Term Follow-Up:** Maternal outcomes were assessed only in the immediate postpartum period; long-term complications (e.g., psychological impact, reproductive outcomes) were not studied.

CONCLUSION

This study reinforces that **uterine atony** remains the leading cause of PPH and that **anemia** and **prolonged labor** are critical risk factors, as seen in global literature. While our cohort achieved high rates of conservative management success, morbidity remained significant, with high transfusion rates and ICU admissions. Future emphasis should be placed on antenatal anemia correction, early identification of prolonged labor, and monitoring of cesarean-related risks. Comparative analysis with other studies—like the Brazilian ICU cohort and multicenter risk analyses—highlights how different care settings and resource availability shape intervention choices and outcomes, offering valuable insight into optimizing PPH prevention and management.

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